DRAFT RESOURCE MANAGEMENT PLAN/ ENVIRONMENTAL IMPACT STATEMENT

Western Oregon

Volume 2

U.S. Department of the Interior
Bureau of Land Management

The BLM manages more than 245 million acres of public land, the most of any Federal agency. This land, known as the National System of Public Lands, is primarily located in 12 western states, including Alaska. The BLM also administers 700 million acres of sub-surface mineral estate throughout the nation.

The BLM's mission is to manage and conserve the public lands for the use and enjoyment of present and future generations under our mandate of multiple-use and sustained yield. In fiscal year 2013, the BLM generated $4.7 billion in receipts from public lands.

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NATIONAL SYSTEM OF PUBLIC LANDS

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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Recreation and Visitor Services

Key Points

- Alternative D provides the greatest number of acres allocated as Recreation Management Areas.
- Alternative A reduces recreation opportunities when compared to the No Action alternative.
- Alternative D provides the greatest number and acres of Recreation Management Areas in closest proximity to the twelve most populated communities in the planning area.

Issue 1

How would the alternatives affect the BLM's ability to provide recreation opportunities and manage for beneficial recreation outcomes across western Oregon?

Summary of Analytical Methods

The BLM evaluated the effects of the alternatives on recreation opportunities and outcomes by comparing how the alternatives affect: A) acres of Recreation Management Areas (RMAs) by type; B) changes to Recreation Setting Characteristics; C) the availability of recreation opportunities and the extent to which they meet anticipated recreation demand in the planning area; and D) acres affected by specific activity prohibitions. This analysis includes both effects from the alternatives' recreation management strategies and effects from management for other program areas on recreation resources.

Management actions and allowable use decisions would affect recreation and visitor services. Direct effects on recreation are those that allow, restrict, or prohibit opportunity, including both the opportunity for access (e.g., public closure) and opportunity to engage in specific activities (e.g., participation in camping, shooting, and riding OHVs). Indirect effects are those that alter the physical, social, or administrative settings. Effects on settings can either be the achievement of a desired setting or the unwanted shift in setting (e.g., to either a more primitive or urban environment).

The BLM does not specifically manage for recreation settings in areas where the BLM has not designated RMAs, although these areas do still provide intrinsic recreational values and opportunities. The indicator typically used to describe the effect on these areas is the availability of opportunities as described by either acreage restrictions or specific activity prohibitions.

For areas managed as Special Recreation Management Areas (SRMAs), the BLM used both availability of recreation opportunities (activities and desired outcomes) and changes to physical, social, and administrative settings as indicators of effects. This analysis analyzed the effects that proposed management decisions would have on managing recreation settings and the targeted outcomes. For areas managed as Extensive Recreation Management Areas (ERMAs), the BLM considered both availability of activity opportunities and changes to the qualities and conditions (i.e., settings). This analysis includes the effects that proposed management decisions would have on managing recreation activities and the prescribed setting conditions. Since visitor use patterns are difficult to estimate and are dependent on many factors beyond the scope of management (e.g., recreational trends and economy) the BLM only used qualitative language (e.g., increase or decrease) to describe anticipated effects on visitation.

<u>Recreation Management Areas</u>

The BLM assumed that designation of an RMA increases its ability to protect and enhance the targeted activities, experiences, benefits, and desired recreation setting characteristics on a long-term basis. The

BLM considered how the alternatives would affect: (1) the types of RMAs, spatial distribution, and acres on BLM-administered lands within the decision area; (2) the type of targeted outcomes and targeted activities; 3) the management actions that result in short-term and long-term elimination, restriction, or reduction of recreation opportunities, activities, experiences, or setting characteristics.

Recreation Setting Characteristics

Visitors seek a diverse range of setting-dependent outdoor recreation opportunities. They choose different areas in which to recreate based on the qualities and conditions of the area and because they want to realize a specific set of recreation experiences and benefits. For example, primitive camping in a backcountry forested setting by a remote lake offers a different experience from camping in a highly-developed campground adjacent to a rural reservoir.

The BLM categorized the type of recreational setting available in a particular area through its recreation setting classification system. The BLM bases its Recreational Setting Classification System on a combination of physical, operational, and social setting characteristics. The combination of these characteristics determines the overall recreational setting for a particular area. This analysis considers the social and physical setting characteristics of remoteness and naturalness because they provide the most direct measure of resource management effects under each alternative. The BLM considered how the alternatives would affect: (1) acres of naturalness and remoteness in RMAs; (2) the protection of setting characteristics in SRMAs and ERMAs; (3) recreation opportunity class by type and acres.

The scale of this analysis is at the forest stand level, which varies greatly across BLM-administered lands. In fact, within a one-square-mile block of ownership, there can be more than a dozen different stand types. This results in an equal number of recreation settings, some of which can be relatively small and disjointed. For example, small patches of old forest scattered throughout young, even-aged stands can result in the Primitive setting being obscured by a more predominate Front Country setting.

The intermixing of setting types affects visitor experiences depending on their individual preferences. Since setting preferences are subjective and vary from one person to the next, this analysis does not consider this interrelationship. Rather, the BLM has analyzed all forest stands on BLM-administered lands within the decision area to calculate the total number of acres within each setting type. This analysis does not consider non-forested lands or BLM-administered lands occupied by existing roads, since timber harvest does not affect the naturalness of these areas. Non-forested habitat and roads account for approximately 4 percent and 3 percent, respectively, of the BLM’s total land base. **Figure 3-135** shows a visual representation of forest structural stage classifications for the naturalness levels for each recreational setting using a series of forest stand visualizations.

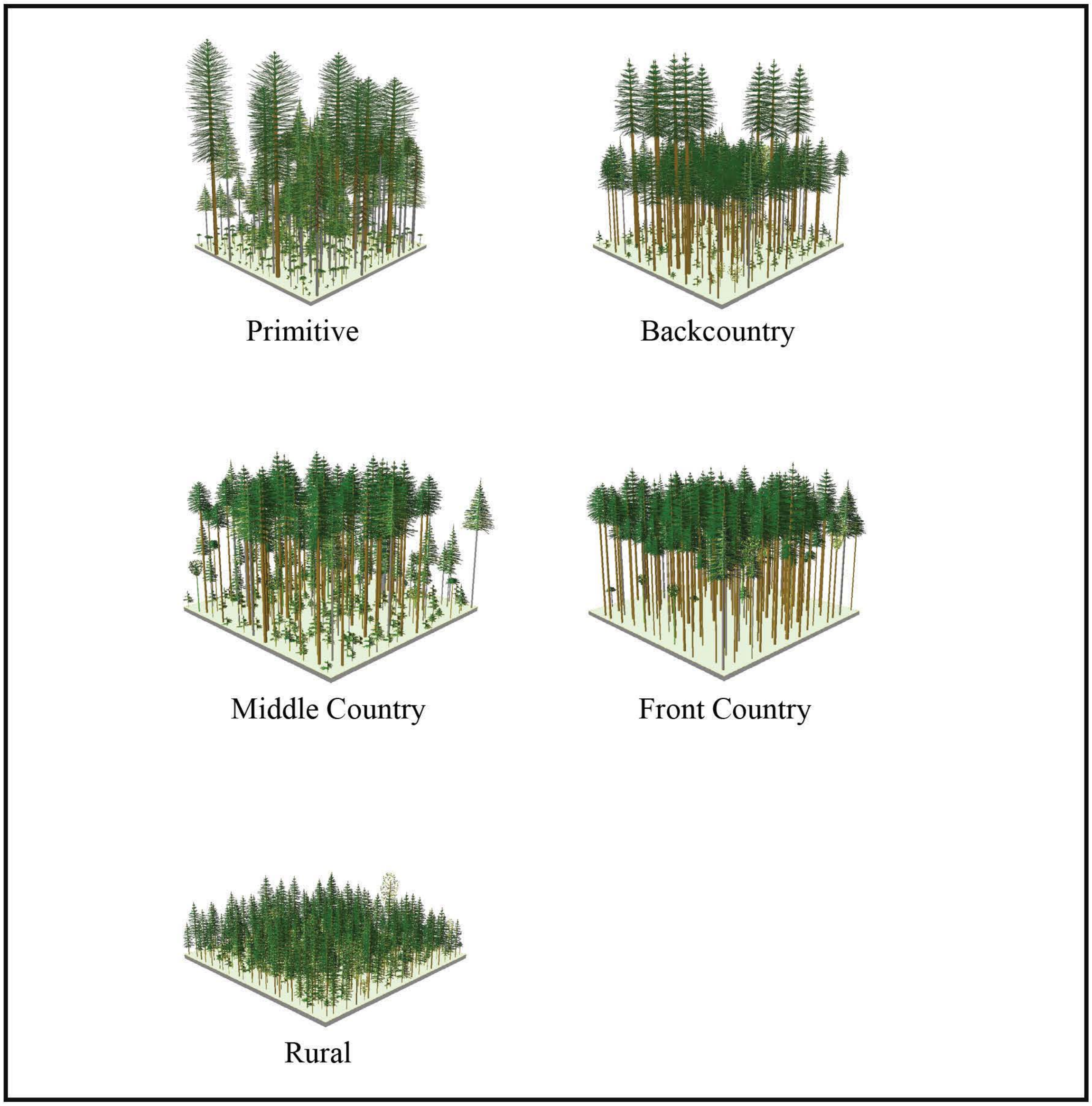


Figure 3-135. Stand Visualizations for Recreational Setting Classifications.

The remoteness and naturalness characteristics are described below, along with how the BLM uses them to identify Recreational Setting Classifications.

Remoteness (proximity to roads and road types): The BLM determines remoteness by using its functional road classification system to assign road types within Middle Country, Front Country, and Rural settings. The BLM bases these classifications on traffic volume, vehicle speed, trip distance, travel mobility, and property access. Road types consist of arterial, collector, local, and resource roads (USDI BLM 1996b, updated 2002). The BLM assigns Primitive and Backcountry-setting classifications to areas based on their proximity away from all of these road types.

The BLM used the total amount of roads (including new road construction projected to occur under the alternatives over the next 10 years) to classify levels of remoteness. This is done by buffering the different road types that occur on BLM-administered lands. **Table 3-124** shows the results of this classification process by alternative. This analysis does not consider the proximity of non-BLM roads located on adjacent lands, since they do not aid in the comparison of alternatives.

Table 3-124. Classification of recreational settings by remoteness.

Recreational Setting Classifications	Level of Remoteness
Primitive	Greater than 1 mile from any class of road, excluding those that are permanently closed or decommissioned
Backcountry	0.25 to 1 mile from any class of road, excluding those that are permanently closed or decommissioned
Middle Country	Within 0.25 mile of local* or resource roads
Front Country	Within 0.25 mile of collector roads
Rural/Urban	Within 0.25 mile of arterial roads or highways

*Collector roads-Roads that primarily provide access to large blocks of public land, accommodate multiple uses, have BLM's highest traffic volumes, and connect with State and county road systems. Local roads-Roads that normally serve smaller areas than collectors, accommodate fewer uses, have lower traffic volumes, and connect with collectors or State and county road systems. Resource roads-Roads that provide point access to public lands, typically exist for a single use, carry very low traffic volumes, and connect with local or collector roads.

Naturalness (landscape quality, level of disturbance, forest structural complexity, and age): For the purposes of classifying recreational settings, the BLM determines naturalness by using forest structural stage classes. **Table 3-125** contains the classification of recreational settings from Primitive to Urban by levels of naturalness.

Table 3-125. Classification of recreational settings by naturalness.

Recreational Setting Classifications	Level of Naturalness
Primitive	• Undisturbed natural landscape • For this analysis, the BLM uses stands that have structurally-complex forest with existing old or very old forest as a proxy for this level of naturalness
Backcountry	• Natural-appearing landscape having modifications not readily noticeable • For this for this analysis, the BLM uses mature forest with a single or multiple canopies as a proxy for this level of naturalness
Middle country	• Natural-appearing landscape having modifications that do not overpower natural features • For this for this analysis, the BLM uses young, high-density forest with structural legacies; or, young, low-density forest with or without structural legacies as proxies for this level of naturalness
Front country	• Partially-modified landscape with more noticeable modifications • For this analysis, the BLM used young, high-density forest without structural legacies as a proxy for this level of naturalness
Rural	• Substantially-modified natural landscape • For this analysis, the BLM used stand establishment forest with or without structural legacies as a proxy for this level of naturalness
Urban	• Urbanized developments dominate landscape

Timber management activities would affect the naturalness aspects of the recreation setting (i.e., forest stand structure and age). This in turn affects where visitors recreate based on their setting preferences. The amount of timber harvest by type and acres that would occur over the next 10 years is used to classify degrees of naturalness along the continuum of recreation settings from Primitive to Rural. This analysis is based on forest stand types that are characteristic of these areas. For example, timber harvest that involves thinning dense, young stands would shift the naturalness of an area from the Front Country to the Middle Country setting. In contrast, the regeneration harvesting of older stands would modify the naturalness of an area from Primitive to Rural. These changes influence the distribution of recreation demand for visitors who prefer these different settings.

Analysis of Recreation Opportunity Restrictions and Targeted Activities

For all areas, the BLM considered the potential for increased or decreased conflict between recreationists because of management actions and allowable use restrictions. Recreational conflict occurs when incompatible activities take place in the same area. Certain activities interfere with the experience expectations of other recreational users (Marcouiller *et al.* 2008). For example, a hiker with the expectation of a quiet experience that encounters an OHV on a trail might consider the encounter as a conflict. The presence of an OHV interferes with the expectation of a quiet outing. Conflict among recreational users is generally asymmetrical; that is, one user might perceive there is a conflict while another user might not perceive there is a conflict (Jackson and Wong 1982). The asymmetrical nature of recreational conflict can result in limited recreational experience opportunities where incompatible activities are allowed in the same area.

Recreation Demand

The BLM estimated recreation demand by considering the estimated number of visitors projected to participate in a particular recreation opportunity from 2014-2024 and beyond. The recreation demand assessment considers the market area or “visitation range” where the majority of the current or potential visitors are likely to reside. The BLM considered the extent to which the alternatives could meet this projected recreation demand. This analysis considered the effect of the alternatives on: (1) recreation activity type and level of recreation demand that will be met; (2) locations where visitation (demand) would exceed the supply of recreation opportunities and where visitor capacity would be exceeded; and (3) the spatial distribution of Recreation Management Areas within market area or “visitation” range (based on drive time from primary western Oregon communities) by acres.

The BLM conducted a recreation demand analysis throughout the planning area in 2013-2014. This analysis provided the BLM with a better understanding of the current levels of recreational demand and scarcity in the planning area. Understanding these current levels of demand assisted the BLM in analyzing the potential effect of the alternatives on different recreation types. The BLM also used this recreation demand analysis in the identification of potential new RMAs for Alternatives C and D. Econ-Northwest conducted a recreation demand analysis throughout the planning area in 2014. The analysis focused on proximity to user populations and both scarcity and demand for recreation opportunities. A number of factors influence the demand for outdoor recreation in western Oregon. This analysis examined recreation context, supply, and demand drivers.

The BLM measured recreation demand in two ways: (1) total number of visitors per year, and (2) total number of participants by 13 primary recreation activity categories. Because a single visitor usually participates in more than one activity, the number of participants is generally higher than the number of actual visitors.

Analysis Assumptions

- Since visitor use patterns are difficult to estimate and dependent on many factors beyond the scope of management (e.g., recreation trends and economy) only qualitative langue (e.g., increase or decrease) is used to describe anticipated impacts on visitation.
- Special designations, either legislative or administrative, would attract more visitors and result in higher use levels. A special identification or designation (e.g., SRMA, WSR) would lead to increased visitation. Designated areas that are currently receiving a custodial level of management would consequently need more intensive recreation oversight and monitoring (e.g., increased facilities, signage, increased staff presence and enforcement, and increased user controls).
- Overlapping designations for other resources are less problematic with ERMAs than with SRMAs, because the BLM designs recreation objectives and management direction for ERMAs to be commensurate with, and considered in the context of, the management of other resources and resource uses.
- Visual Resource Management classes support the desired physical recreation settings and aid in the attainment and long-term protection of these settings.

Background

The BLM's Recreation and Visitor Services Program manages recreation resources and visitor services to offer the greatest benefits possible to individuals and communities and to enable communities to achieve their own desired social, economic, and environmental outcomes. In previous planning efforts, which are reflected in the current RMAs, SRMAs were established where BLM-administered lands were experiencing heavy recreation use or where the BLM planned on making large investments in staff, funding, facilities, or time. All remaining BLM-administered lands were an ERMA, regardless of whether recreation occurred or was a management objective. Due to new BLM policy (BLM Manual 8320 – Planning for Recreation and Visitor Services 2011), through the current planning process the BLM will designate some BLM-administered lands within the decision area as SRMAs or ERMAs, but will not identify other BLM-administered lands for recreation; these lands that will not be managed for recreation will be known as public lands not designated.

Under the new policy, the BLM only designates SRMAs where it recognizes recreation management as the predominant land use plan focus and where the BLM intends to manage and protect specific recreation opportunities and setting characteristics on a long-term basis. In addition, ERMAs are administrative units that require specific management consideration in order to address recreation use or demand, but where recreation management is commensurate and considered in context with the management of other resources and resource uses. Defining adverse or beneficial effects is often subjective for the purposes of recreation and visitor services. A management action may be adverse to one individual or user group, while also beneficial to another individual or user group. Therefore, the BLM does not use the terms adverse or beneficial in this analysis.

A majority of the BLM-administered lands in western Oregon are intermingled with private lands. Legal public access is often not available where private lands surround BLM-administered lands. In such cases, reciprocal right-of-way agreements, easements, and unsecured access rights across adjacent private lands all have a determining effect on public access, which, in turn, influence visitor use. This lack of comprehensive legal public access constrains the Bureau's ability to manage for recreational opportunities on a substantial portion of its lands in western Oregon.

The BLM has assigned either a secured or an unsecured legal public access status to every distinct Recreation Management Area unit of the BLM-administered lands throughout western Oregon. Secured legal public access occurs where the United States has secured public access rights across private land. Public access rights are generally included in the acquisition of exclusive or access road easements where the United States has acquired control of the right-of-way. Physical access to these blocks of public land must be present and available via roads, trails, or navigable waterways. Unsecured legal public access occurs where the United States has not secured public access rights across private land. Administrative access may be legally and physically available to the BLM, although the right-of-way agreements or easements do not include legal access rights for the public.

Affected Environment

BLM-administered lands in western Oregon offer diverse opportunities for a variety of outdoor recreation activities and related benefits. Typical recreation activities on BLM-administered lands include camping, hiking, horseback riding, mountain biking, OHV use, and picnicking.

BLM-administered lands are not the sole provider of recreational settings and opportunities in western Oregon, and many additional opportunities exist on other Federal, State, and county lands throughout the planning area. Other recreation-tourism markets also affect the amount of use on BLM-administered lands. An estimated 18 percent of all outdoor recreation participation in western Oregon occurs on BLM-administered lands (USDI BLM Recreation Management Information System 2014). For comparison purposes, BLM-administered lands account for 12 percent of all lands within the region. Recreation visitors to the planning area come from three primary sources: national and international locations, major metropolitan areas, and local communities.

Recreation Management Areas

The BLM currently manages 29 SRMAs in western Oregon that total 168,968 acres, accounting for 6 percent of BLM-administered lands within the planning area. Under the 1995 RMPs, the BLM identified BLM-administered lands not delineated as an SRMA as an ERMA. In ERMAs, current management consists primarily of providing basic information and access. Dispersed recreation occurs in ERMAs, and visitors have the freedom of recreational choice with minimal regulatory constraints. Recreation issues or management concerns are apparent in ERMAs throughout the planning area where limited recreation management is present. These issues are most apparent in ERMAs within the Rural Urban interface where increased recreation activities (including off-highway vehicle use and target shooting) have led to social and natural resource impacts. The BLM manages 14 ERMAs in western Oregon totaling 2,397,460 acres, accounting for 94 percent of BLM-administered lands within the planning area. See **Appendix N** for an overview of Recreation Management Areas by district.

Recreation Participation

Table 3-126 and **Figure 3-136** provide the current level of participation for the 13 primary recreation activities on BLM-administered lands in western Oregon, the annual rate of change for each activity (based on statewide trends), and their projected levels by the year 2060.

Table 3-126. Current and projected levels of participation by recreation activity within the planning area from 2012 to 2060.

BLM Recreation Categories	Current Number of Participants (2012)	Projected Number of Participants				
		2020	2030	2040	2050	2060
Wildlife Viewing, Interpretation, and Nature Study	2,564,574	2,810,926	3,149,289	3,456,865	3,751,811	4,056,276
Driving for Pleasure (Along Designated BLM Roadways)	1,959,729	2,140,696	2,388,704	2,610,605	2,819,454	3,033,896
Camping and Picnicking	1,273,349	1,389,106	1,548,035	1,689,978	1,822,216	1,956,881
Non-motorized Travel (Hiking, Biking, and Horseback Riding)	1,211,201	1,334,041	1,499,867	1,666,874	1,841,117	2,031,541
Hunting (Big Game, Upland Game, and Migratory Game Birds)	1,063,709	1,111,142	1,159,767	1,197,012	1,232,188	1,270,468
Motorized Off-Highway Vehicle Travel	826,256	887,031	955,996	1,035,266	1,128,804	1,238,989
Fishing	598,420	645,558	706,223	760,591	814,388	872,763
Specialized Non-motorized Activities and Events	458,870	501,333	559,264	612,440	663,431	716,455
Swimming and Other Water-Based Activities	424,376	467,997	526,296	583,388	640,883	701,192
Non-motorized Boating	224,876	242,296	262,362	286,958	315,870	349,744
Motorized Boating	97,622	107,563	119,936	133,508	149,019	167,485
Non-motorized Winter Activities	50,444	56,687	64,711	73,679	84,205	97,138
Snowmobile and other Motorized Winter Activities	6,903	7,428	7,998	8,734	9,629	10,697
Total All Activities	**10,760,329**	**11,701,805**	**12,948,446**	**14,115,899**	**15,273,015**	**16,503,525**

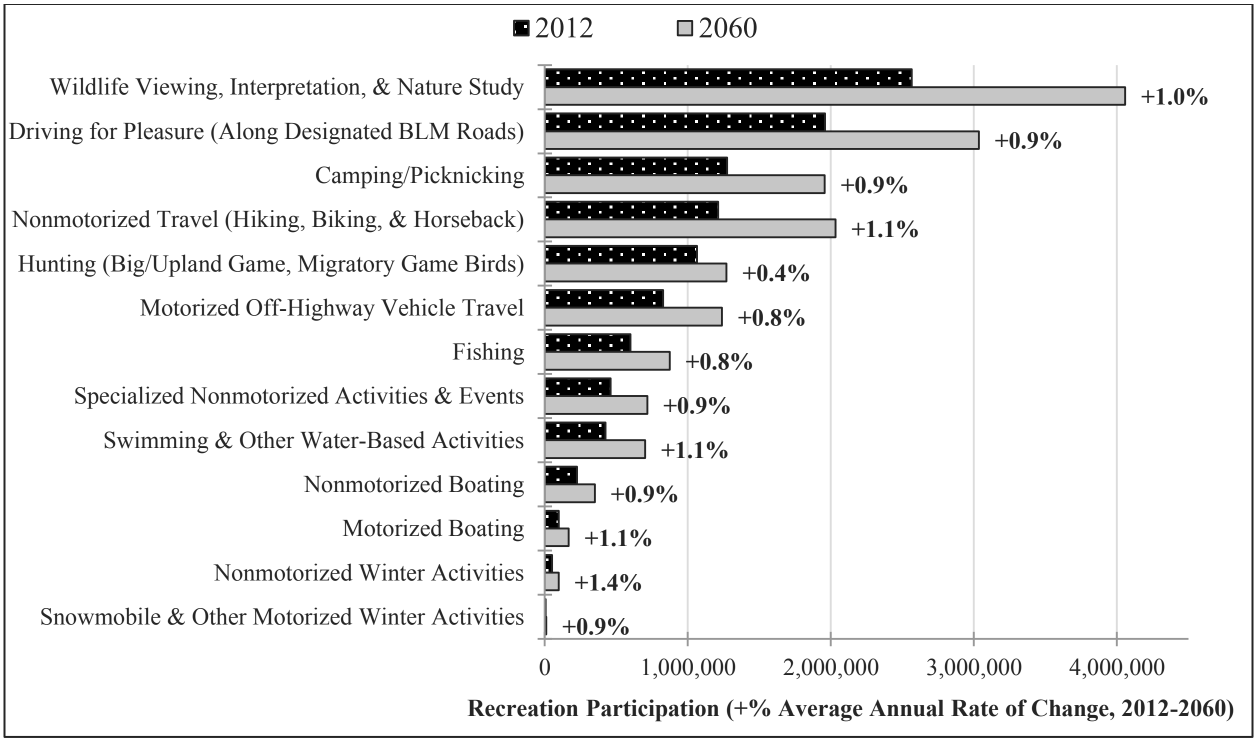


Figure 3-136. Projected levels of change by recreation activity within the planning area from 2012-2060.

Recreation Supply and Demand Estimates

The BLM evaluated activity-specific recreation demand for the twelve communities within the project area with the largest resident populations. **Table 3-127** provides a summary of 2,265 responses to the 2012-2013 interactive BLM website that solicited public input. Results show community level and activity specific recreation demand preferences for 17 distinct recreation activities across western Oregon.

Table 3-127. Activity-specific recreation demand for western Oregon communities.

Recreation Activity	Percentage of Activities in Each Community											
	Coos Bay	Corvallis	Eugene	Grants Pass	McMinnville	Medford	Newberg	Portland	Roseburg	Salem	Sandy	Tillamook
Nature Viewing	4%	3%	6%	2%	7%	3%	4%	2%	3%	3%	2%	3%
Non-Motorized Trails	6%	5%	6%	11%	4%	12%	4%	5%	5%	8%	6%	5%
Water Trail	-	1%	-	-	-	-	-	1%	-	-	1%	1%
Hiking	2%	6%	6%	9%	7%	8%	2%	1%	6%	5%	6%	4%
Mountain Biking	17%	34%	29%	17%	18%	16%	21%	37%	14%	23%	27%	19%
Horseback Riding	1%	3%	5%	7%	4%	3%	4%	3%	4%	7%	5%	3%
Riding OHVs	48%	19%	25%	29%	28%	31%	29%	21%	43%	26%	30%	25%
Hunting-Fishing	4%	6%	9%	3%	5%	2%	5%	4%	6%	7%	4%	7%
Camping-Picnicking	2%	2%	3%	3%	7%	2%	4%	2%	2%	5%	2%	2%
Hang Gliding-Paragliding	10%	8%	4%	10%	11%	11%	20%	13%	4%	4%	6%	22%
Target Shooting	2%	5%	2%	1%	2%	1%	4%	4%	1%	7%	4%	2%
Gold Panning-Dredging	2%	1%	1%	2%	1%	2%	1%	1%	2%	2%	1%	1%
River Recreation	1%	2%	1%	3%	4%	1%	2%	2%	2%	-	2%	2%
Rock Hounding	1%	4%	1%	1%	1%	1%	-	2%	1%	1%	1%	2%
Rock Climbing	-	1%	1%	1%	-	1%	-	1%	6%	-	2%	-
Winter Activities	-	-	1%	1%	1%	6%	-	1%	1%	2%	1%	2%

Self-reported participation on the BLM's interactive mapping site revealed differences in outdoor recreation as a function of both supply opportunities and demand preferences. Among respondents, motorized trail use is slightly greater than non-motorized trail use in the southern portion of the region, while the opposite holds true for respondents in the northern portion (**Table-127**). Population centers throughout western Oregon are shown in **Figure 3-137**, with the Portland Metro area the largest. Applying travel times distances from Portland (**Figure 3-138**) as well as other population centers in western Oregon (**Figure 3-139**) reveals the portions of BLM-administered lands that can be accessed relatively easily for recreation, and the distribution of non-motorized trail recreation in 2012 at the district level.

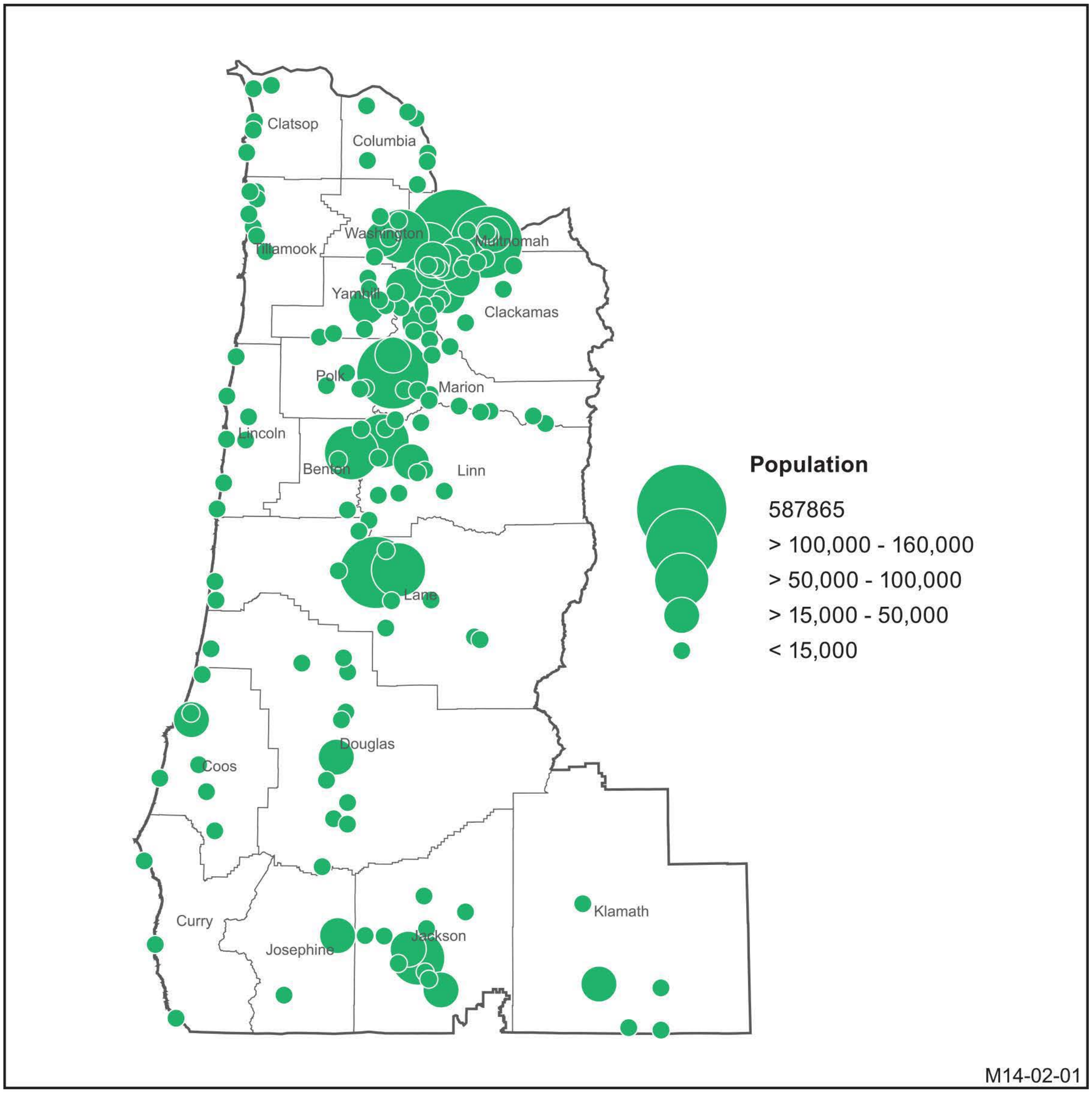


Figure 3-137. Western Oregon population centers.

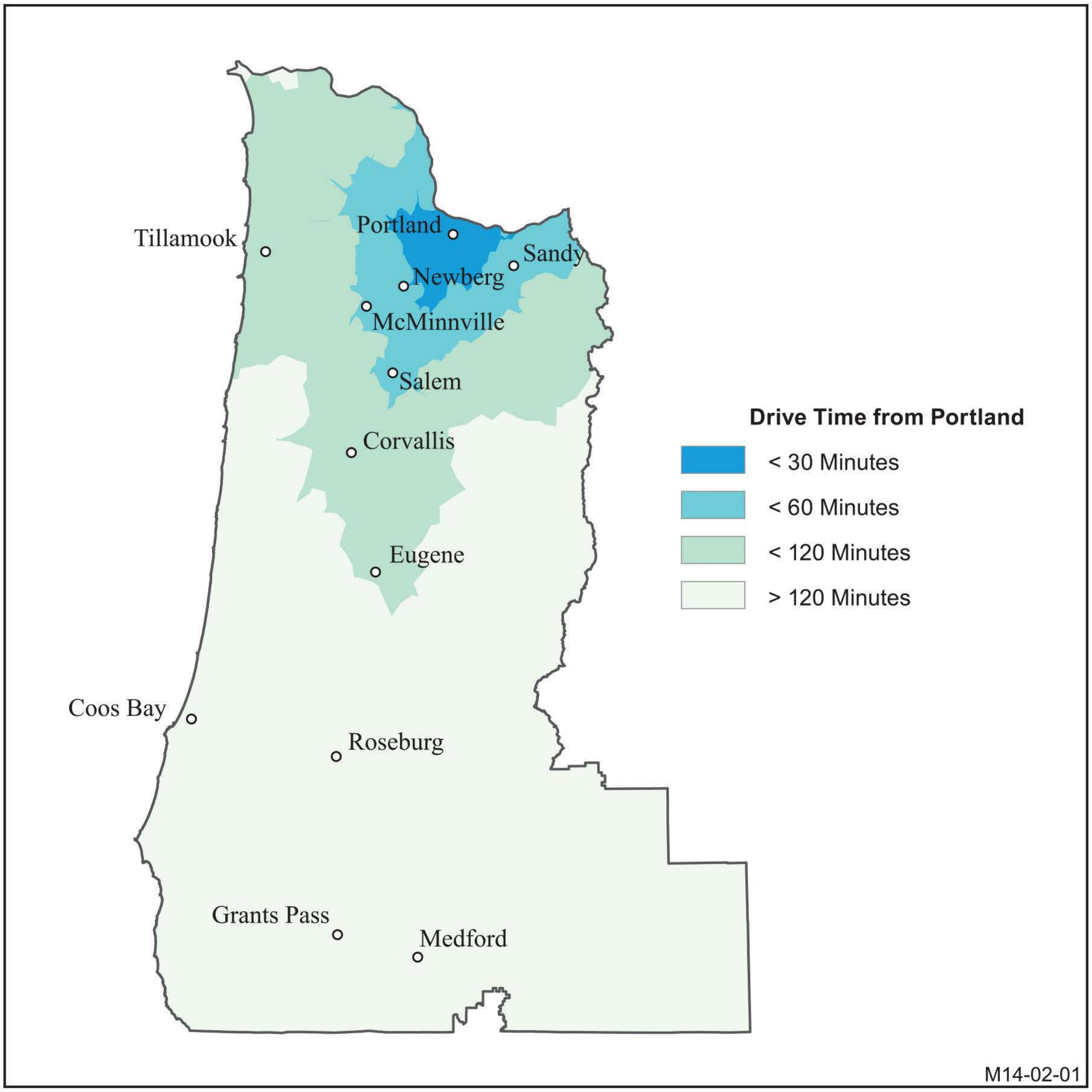


Figure 3-138. Travel times from Portland city center, and BLM RMIS non-motorized recreation data (annual, 2012).

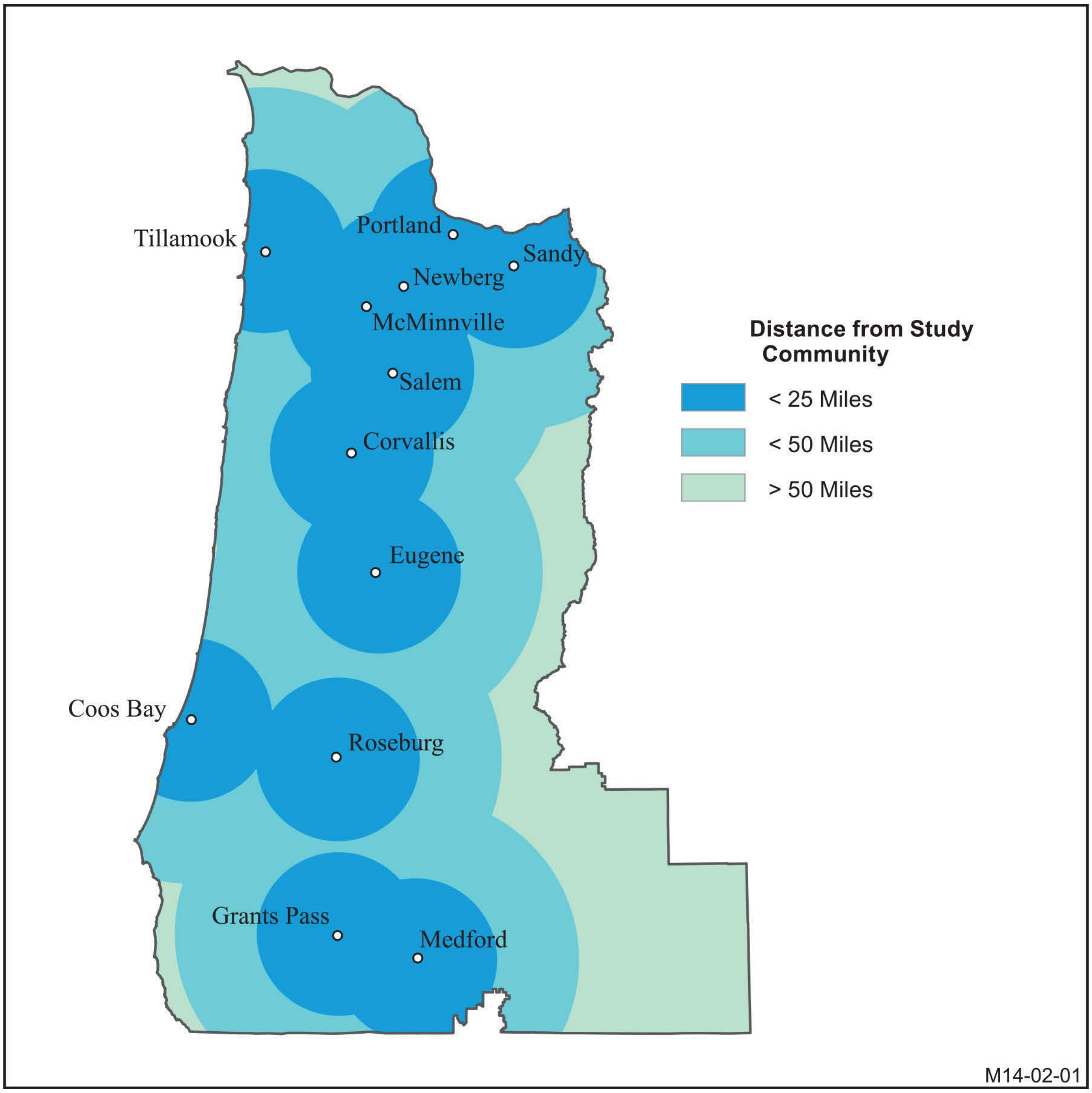


Figure 3-139. Travel times from western Oregon population centers, and BLM RMIS non-motorized recreation data (annual, 2012).

The BLM evaluated the activity-specific recreation demand for the 12 communities within the planning area with the largest resident populations. Population centers and access tend to drive demand for outdoor recreation opportunities. The northern Willamette Valley is the most heavily-populated portion of the region, dominated by the Portland Metro Area (**Figure 3-140**). Recreation opportunities within proximity to these population centers experience the most demand, and consequently have the potential to provide the most value, when they provide the types of recreation of interest (**Map 3-6** in Socioeconomics). While access is often quite difficult through rugged and mountainous areas, the majority of the western Oregon region is within 50 miles of one of these 12 population centers.

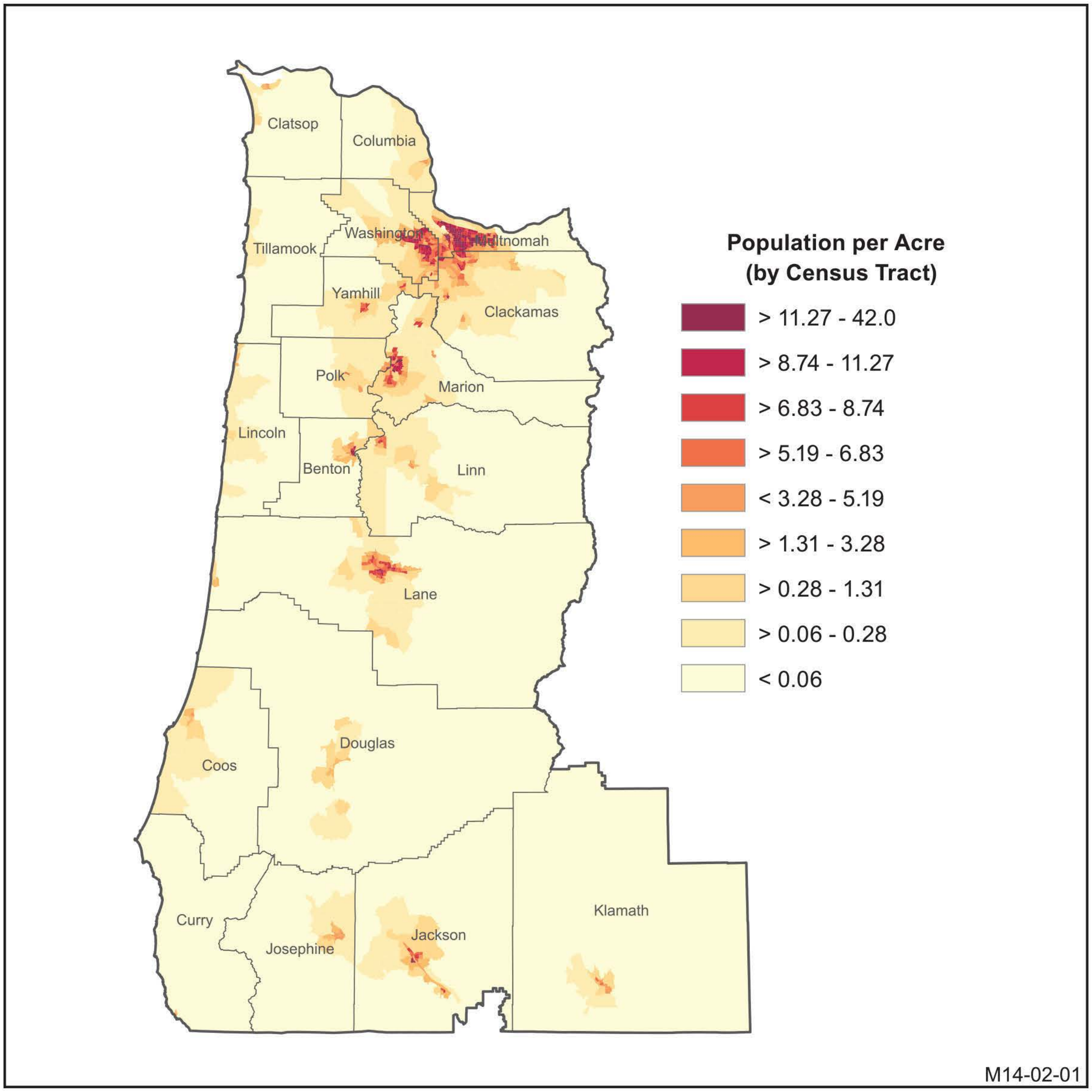


Figure 3-140. Western Oregon population density.

Environmental Effects

Effects from Recreation and Visitor Services Management

Recreation Management Areas

The acreage and spatial distribution of RMA types varies under alternatives A, B, C, and D; thus, the BLM's ability to provide recreation opportunities varies by alternative. In all action alternatives, acres the BLM does not designate as SRMAs/ERMAs are public lands not designated for recreation. The BLM manages public lands not designated for recreation to meet non-recreation objectives.

Within SRMAs, recreation and visitor services management are the predominant land use focus; the BLM manages and protects specific recreation opportunities and recreation setting characteristics on a long-term basis. The BLM manages ERMAs to support and sustain the principal recreation activities and the associated qualities and conditions. Since management of ERMAs is commensurate with the management of other resources and resource uses, all recreation and visitor services decisions must be compatible with other resource objectives.

A detailed management framework (i.e., proposed objectives, recreation setting characteristics, management action and allowable use decisions) for SRMAs and ERMAs proposed in Alternatives A, B, C, and D can be found in **Appendix N**.

No Action Alternative

During the development of the 1995 RMPs, the BLM identified the locations of the current SRMAs based on where it was experiencing heavy recreation use or where it planned to make large investments in staff, funding, facilities, or time. Consistent with its policy at the time, the BLM then identified all remaining BLM-administered lands as an ERMA. Under the No Action alternative, western Oregon BLM districts would continue to manage 29 SRMAs totaling 168,968 acres and 14 ERMAs totaling 2,397,460 acres (**Tables 3-128** and **3-129**). Districts would manage all Recreation Management Areas under direction set forth in the 1995 RMP and related amendments. Every acre of BLM-administered land within the decision area would have an RMA designation, although this is no longer consistent with current BLM policy.

Table 3-128. Summary of existing and proposed Special Recreation Management Areas by alternative.

District/Field Office	No Action (Acres)	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)	Alt. D (Acres)
Coos Bay	4,310	468	468	468	1,600
Eugene	31,466	104	95	241	8,645
Klamath Falls	19,405	612	2,691	7,451	23,873
Medford	36,363	17,199	19,782	46,155	48,235
Roseburg	5,952	167	165	2,413	2,413
Salem	71,472	1,515	1,771	2,318	1,927
Totals	**168,968**	**20,065**	**24,972**	**59,046**	**86,693**

Table 3-129. Summary of existing and proposed Extensive Recreation Management Areas by alternative.

District/Field Office	No Action (Acres)	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)	Alt. D (Acres)
Coos Bay	317,867	-	6,146	14,790	19,758
Eugene	285,274	-	20,416	23,971	26,323
Klamath Falls	208,138	-	66,779	89,842	192,262
Medford	831,864	-	12,283	135,837	219,169
Roseburg	422,147	-	6,819	39,083	40,502
Salem	332,170	-	26,877	54,248	82,444
Totals	**2,397,460**	**-**	**139,320**	**357,771**	**580,458**

The No Action alternative would have a detrimental effect on recreation areas where current management objectives and direction fail to provide adequate management for emerging recreation trends and increased visitation. These effects would likely become substantial in localized areas over the life of the plan. There would be no protection of recreation settings, activities, and outcome opportunities in areas outside of where the BLM has previously-developed and traditionally-managed recreation use. Over time, recreation opportunities would be lost where recreation conflicts with other resource uses, primarily forest management, incompatible recreation activities, and lands and realty. Opportunities would also be lost where recreation conflicts with other types of recreation (e.g., motorized/non-motorized, target shooting/non-target shooting, quiet use/crowded use).

Existing developed recreation sites would often meet the current level of recreation demand in the planning area. However, seasonal crowding at certain developed sites (Fishermen's Bend, Sandy Ridge Trail System, etc.) would affect user enjoyment of the area because use exceeds management capability and anticipated increases in recreation demand. Similarly, the anticipated increase in recreation over the life of the RMP could result in the demand for additional or expanded recreation sites and trail systems because of user conflicts and degraded recreation experiences. Without management direction establishing principal activities and allowable use restrictions protecting desired recreation settings, the BLM's existing RMAs would be insufficient to meet demand, provide targeted recreation outcomes, and protect proposed recreation settings.

Existing motorized and non-motorized trails within the decision area would continue to attract users, but a lack of supporting management objectives and actions would limit effective management and allow for increased conflict between recreation and competing uses along both motorized and non-motorized trails.

Alternative A

Under Alternative A, the BLM would designate 141 SRMAs totaling 20,065 acres. Alternative A would designate SRMAs where existing developed recreation sites or facilities currently exist within the planning area. The BLM would not designate ERMAs within the planning area. In effect, Alternative A places an emphasis on the management and protection of recreation opportunities on less than 1 percent of the planning area.

When compared to Alternatives B, C, and D, Alternative A would designate the fewest acres for recreation management. Alternative A would only designate SRMAs where the BLM recognizes recreation as the predominant land management focus. Alternative A places an emphasis on the management and protection of developed recreation facilities on BLM-administered lands within the planning area.

Alternative A would not provide for recreation management at areas outside of where the BLM has current developed recreation facilities. This would result in a lack of objectives and management direction for intensively-visited areas that exist outside of where the BLM has developed recreation facilities as well as for areas outside of developed recreation facilities for lands providing the most sensitive or unique opportunities. This would result in reactive recreation management aimed at addressing problems and issues rather than management that proactively addresses and provides for public use.

The BLM's lack of proactive management of public visitation to high use areas outside of developed recreation facilities in Alternative A would create management issues. These include continued private property trespass, OHV incursion, and route proliferation. The BLM expects visitation within the decision area to increase over the life of the plan, increasing these issues and leading to the continued decline in both recreation settings and environmental resources if the BLM does not provide and manage for additional recreation opportunities.

Alternative B

Alternative B would designate 134 SRMAs totaling 24,972 acres and 75 ERMAs totaling 139,320 acres. Alternative B would designate SRMAs at currently-developed recreation facilities and on lands where there are both unique recreation opportunities and where SRMA designation would not conflict with sustained yield timber harvest. This alternative would designate ERMAs where the BLM has developed, and currently manages, recreation areas, primarily where the BLM has authorized motorized and non-motorized trails, and where the BLM currently manages dispersed recreation activities. Alternative B would place an emphasis on the management and protection of recreation opportunities on approximately 6 percent of the decision area and would allocate less than 1 percent of the decision area as an SRMA to protect the management and protection of recreation opportunities as the primary land use focus.

Under this alternative, the BLM would provide sufficient management direction to preserve the desired physical Recreation Setting Characteristics within both SRMAs and ERMAs. These restrictions would restrict or prohibit the type of development that would affect these settings and shift the setting characteristics to an undesirable setting.

When compared with Alternative A, Alternative B would provide for the protection of the majority of existing recreation opportunities, visitor activities, experiences, and outcomes that are currently available to visitors of BLM-administered lands within the planning area. Visitation would increase based on the current trends identified in **Table 3-126**. The BLM assumed that increased visitor use would result from the protection of these unique recreation settings and the establishment of recreation outcome objectives on the 139,320 acres of designated ERMAs when compared to Alternative A. Compared to the No Action alternative, Alternative B would establish allowable use activities within both SRMAs and ERMAs. Limiting incompatible activities and adequately managing anticipated increases in visitor use would lead to the long-term protection of desired targeted recreation setting characteristics.

Alternative C

Alternative C would designate 139 Special Recreation Management Areas totaling 59,046 acres and 119 Extensive Recreation Management Areas totaling 357,771 acres. Alternative C would designate SRMAs at currently developed recreation facilities and on lands where designation does not conflict with sustained yield timber harvest. This alternative would designate ERMAs where the BLM has developed and currently manages recreation activities outside of developed facilities, primarily where the BLM has authorized motorized and non-motorized trails, and where the BLM currently manages dispersed recreation activities. Alternative C would also designate SRMAs and ERMAs where the BLM is seeking to address activity-specific recreation demand. Alternative C places an emphasis on the management and protection of recreation opportunities on approximately 16 percent of the decision area. Alternative C would allocate 2 percent of the decision area as an SRMA to provide the management and protection of recreation opportunities as the primary land use focus.

Compared to Alternatives A and B, Alternative C would allocate approximately three times as many acres as SRMAs. Increased SRMA designation would result in the long-term protection of Recreation Setting Characteristics on 59,046 acres. Alternative C would allocate more acres as ERMA when compared to Alternatives A and B, and less when compared with Alternative D. The BLM assumed that increased visitor use would result from the increased protection of unique recreation settings and the establishment of recreation outcome objectives when compared to Alternatives A, B, and the No Action alternative.

Alternative D

Alternative D would designate 141 SRMAs totaling 86,693 acres and 143 ERMAs totaling 580,458 acres. Alternative D builds off the RMA designations in Alternatives A through C. In addition to the designation criteria established in previous alternatives, the BLM would designate RMAs where known historic recreation use has occurred within the BLM-administered lands in the decision area, to the maximum extent possible without precluding sustained yield timber harvest.

Alternative D would allocate the greatest number of acres as Recreation Management Areas when compared to Alternatives A, B and C. Alternative D places an emphasis on the management and protection of recreation opportunities on approximately 27 percent of the decision area. Alternative D allocates 3 percent of the decision area as an SRMA to protect the management and protection of recreation opportunities as the primary land use focus. The BLM assumed that increased visitor use would result from the increased protection of unique recreation settings and the establishment of recreation outcome objectives when compared to A, B, C, and the No Action alternative.

Recreation Opportunity Restrictions and Targeted Activities

Restriction of certain recreation activities (through ACEC special management, implementation of biological resource management, or protection of Recreation Setting Characteristics in SRMAs or ERMAs) would reduce opportunities for these activities on public lands. **Table 3-130** summarizes these activity-specific recreation restrictions.

Table 3-130. Recreation activities restricted within the decision area.

Recreation Opportunities	Activity-specific Restrictions			
	Alt. A (Acres)	**Alt. B (Acres)**	**Alt. C (Acres)**	**Alt. D (Acres)**
Horseback Riding	1,048	8,828	49,414	63,620
Hiking	-	1,511*	32,220 (2,924*)	38,983 (2,924*)
Mountain Bicycling	1,248	13,814	57,490	75,402
OHV Use	17, 517	49,970	87,265	105,474
Overnight Camping	829	18,006	60,205	66,611
Target Shooting	18,236	41,681	66,407	135,464

*Seasonal restrictions

Under each alternative, the BLM emphasizes specific recreation activities within RMAs in order to create and sustain high-quality recreation opportunities, to achieve desired recreation conditions, or to protect Recreation Setting Characteristics. **Table 3-131** summarizes areas where certain recreation activities are emphasized and enhanced.

Table 3-131. Recreation activities emphasized within the decision area.

Recreation Opportunities	Activity-specific Emphasis			
	Alt. A (Acres)	**Alt. B (Acres)**	**Alt. C (Acres)**	**Alt. D (Acres)**
Horseback Riding	19,017	155,480	367,402	603,530
Hiking	20,065	164,307	384,595	628,167
Mountain Bicycling	18,817	150,494	359,326	591,748
OHV Use	2,548	114,338	329,551	561,676
Overnight Camping	19,235	146,301	356,611	600,539
Target Shooting	1,829	122,627	350,409	531,687

Under all action alternatives, camping restrictions would protect resources, reduce conflicts, and reduce long-term camping (squatting) on BLM-administered lands. The BLM anticipates that under all action alternatives, there would be a decrease in littering and unsanitary conditions as the BLM invokes camping restrictions. Alternative C and then Alternative D would have the most camping restrictions and Alternatives B and A would have the least.

Under all alternatives, firearm use restrictions would curb inappropriate recreational target shooting and improve public safety. Firearm use restrictions would also reduce the associated litter including brought onto BLM-administered lands for targets. Alternative D and then Alternative C propose the most areas where recreational target shooting is restricted followed by Alternatives B and A.

Under all alternatives, the BLM identifies non-motorized trail activities and locations where the BLM would restrict these activities. Non-motorized trail activities would be restricted in areas where increased visitor conflict is expected and where the BLM is emphasizing conflicting activities. Alternatives D and then Alternative C propose the most areas where equestrian use is restricted followed by Alternative B and A. Alternatives D and C propose the most areas where mountain biking is restricted followed by Alternative B and A.

Under all alternatives, the BLM identifies the types of recreation activities and emphasizes locations of these activities. Emphasizing specific recreation activity locations would ensure that investments in recreation are as efficient and effective as possible. Under all alternatives, decisions were made about where to potentially develop new recreation opportunities to provide the greatest benefits possible in terms of visitor demand, desired experiences, and beneficial outcomes. Under the action alternatives, the acres targeted for specific recreation activities would increase in acreage from Alternatives A through D.

Recreation Setting Characteristics

This analysis considers how the setting characteristics of remoteness and naturalness would vary by alternative. Remoteness and naturalness, which are defined in the methods section, provide a measure of how the alternatives would affect the recreational experiences available on BLM-administered lands.

Timber management actions that require new road construction would affect the level of remoteness of an area. Increasing the amount or improving the type of access into an area can lead to higher levels of certain types of use. Such changes can also displace certain types of visitors who prefer a more remote setting.

Under all alternatives, the recreation settings are static and would not significantly change from values that currently exist in the No Action alternative. The BLM anticipates minor changes to remoteness levels because new road construction for timber harvest under each alternative would only require small increases in additional local and resource roads. These road types would be developed within the Middle Country setting or further into the Backcountry or Primitive settings. These settings vary by less than 0.5 percent each under the action alternatives. Because of the extensive road network that already exists on BLM-administered lands, new road construction under the action alternatives would not measurably change these existing levels of remoteness.

These minor changes in remoteness levels for each alternative cannot be modeled or shown because new road construction is only projected numerically (i.e., mileages) and not mapped spatially. So even though miles of new road construction may be known, there is no way to determine where new construction would occur and if it would increase or decrease remoteness acreage numbers.

Under all alternatives, there would be no effect to the variety of recreational opportunities that exist on BLM-administered lands when considering remoteness levels. As a result, the majority of BLM-administered lands would continue to be located within a quarter-mile of roads, which are more conducive to motorized forms of recreation. Under all alternatives, 22 percent of BLM-administered lands would continue to be within the Primitive and Back Country settings, which are favored by those seeking non-motorized recreational opportunities.

Table 3-132 shows the naturalness component of the Recreation Setting Characteristics (naturalness) by alternative.

Table 3-132. Naturalness levels by alternative.

Alternative	Primitive (Acres)	Back Country (Acres)	Middle Country (Acres)	Front Country (Acres)	Rural (Acres)
No Action	588,776	516,118	178,922	443,170	435,232
Alt. A	627,043	623,388	156,681	396,966	357,621
Alt. B	621,105	617,535	161,534	427,101	334,424
Alt. C	590,837	566,186	149,499	414,083	441,094
Alt. D	629,097	659,078	162,275	398,293	312,956

When considering the decision area, all alternatives would have a relatively minor effect on naturalness settings. This is largely due to the short duration for which timber harvest practices would modify forest stands under each alternative. As a result, all action alternatives would continue to maintain a mix of naturalness settings that provide a variety of recreational opportunities and experiences for visitors.

The alternatives would have some minor effects on visitor use patterns when comparing visitor setting preferences for different recreational activities with changes to individual naturalness settings. This analysis assumed that visitor preferences for naturalness would be similar to their overall recreation setting preferences, which includes physical, administrative, and social setting characteristics.

All four action alternatives would have relatively minor effects to existing levels of the Primitive and Backcountry settings.

Existing levels of these settings account for 24 percent and 21 percent, respectively, of all BLM-administered lands in the decision area because of the following:

- The small changes to these settings under all four action alternatives would not diminish or improve recreational opportunities within these areas, due to their large proportion of the entire land base.
- The greatest levels of recreational use that occur within these settings are from non-motorized activities, such as hiking, horseback riding, hunting, and fishing. High levels of use from mountain biking, wildlife viewing, camping, and picnicking also occur within the Backcountry setting. Visitors seeking these activities may experience localized changes within these settings, but visitor use patterns associated with these activities would not be affected when considering the entire land base.

All action alternatives would affect the Middle Country setting by a relatively small percentage.

- The highest percentage of almost every recreational activity occurs within this setting, which is likely due to a combination of both naturalness and remoteness characteristics.
- Middle Country provides the highest level of naturalness within close proximity to roads, which is preferred by visitors who are seeking nature-based experiences that are easily accessible.
- When considering the BLM's decision area, 41 percent is Middle Country based on remoteness levels. However, less than 1 percent is Middle Country when considering naturalness.
- All action alternatives would decrease the proportion of Middle Country (based on naturalness levels) compared to the No Action alternative, thereby decreasing recreational opportunities and experiences for visitors who prefer this setting.

All action alternatives would reduce the Front Country setting by no more than 10 percent.

- When considering the BLM's decision area, 18 percent is classified as Front Country (based on existing naturalness levels), which is proportionally less than the Primitive and Backcountry settings.

Alternatives A, B, and D would decrease the Rural setting.

- The naturalness aspect of this setting is a substantially-modified environment (from a forestry standpoint).
- These areas are generally not conducive to primitive forms of recreational use; however, high levels of recreation use occur within this setting. This is likely due to the experiences derived from improved access, amenities, and social interactions within developed recreation sites, which are also located within the overall Rural setting. These experiences are generally more important to visitors in the Rural setting than experiences derived from the physical aspects of the environment.
- Since 17 percent of the BLM's lands are classified as Rural when considering naturalness levels, decreasing the amount of this setting by as much as 28 percent would not noticeably affect overall recreational opportunities and experiences for visitors.
- Substantially modifying the natural setting of certain areas would have a localized effect on visitors who prefer to recreate in those areas. As a result, some localized displacement of visitors would occur. This effect would be greatest under Alternative D.

Although some localized effects would occur within each of these settings, none of the changes would be measurable enough to influence visitor use patterns that are associated with any single recreation activity within the decision area. As a result, all action alternatives would continue to maintain a mix of naturalness settings that provide a variety of recreational opportunities and experiences for visitors.

The social recreation setting characteristics (i.e., contacts, group size, and evidence of use) that characterize the interaction or indication of visitors are likely to parallel the changes in remoteness. One exception may be areas that are closed to motorized use but emphasize mountain biking. Recreation Management Areas like the Sandy Ridge Trail System or the Mountain of the Rogue Trail System may actually see an increase in use due to the popularity of mountain biking in areas without motorized vehicles.

Recreation Supply and Demand

For analysis purposes, the BLM focused on the 12 most populated communities within the planning area when evaluating the alternatives effects to recreation supply and demand. The most general type of recreation development that is proposed within RMAs is motorized and non-motorized trails. To further highlight this recreation type, the following effects analysis focuses on trails in general and RMAs that target popular trail based activities within the planning area (hiking, mountain biking and off-highway vehicle use) specifically. See the full Recreation Supply and Demand report for detail on other recreation activities http://www.blm.gov/or/plans/rmpswesternoregon/recreation.php .

Individual RMAs do not identify total miles of trail per area, but extrapolating from available trail miles per acre under current conditions allows an approximation of the number of trail miles that would be available under each alternative. Currently there are approximately 395 miles of trails on BLM-administered lands in western Oregon, this could increase to 1,000 miles under Alternative C, or to 1,600 miles under Alternative D (**Table 3-133)**.

Table 3-133. Potential RMA trail miles by alternative.

District/Field Office	No Action (Miles)	Alt. A (Miles)	Alt. B (Miles)	Alt. C (Miles)	Alt. D (Miles)
Coos Bay	35	2	35	81	114
Eugene	46	-	46	54	78
Klamath Falls	29	-	29	42	92
Medford	146	79	146	831	1,221
Roseburg	39	1	39	230	238
Salem	100	5	100	197	294
Totals	**395**	**49**	**395**	**1,012**	**1,619**

Hiking Trails

The availability of all identifiable non-motorized hiking trails (BLM and non-BLM) within a 30-minute and 60-minute drive of the selected communities varies, with Sandy having the most trail miles available within both the 30-minute and 60-minute times (**Tables 3-134** and **3-135**). Based on the available trail data, accessible hiking trails are generally scarcer for Coos Bay and Tillamook than the other communities when looking at a 60-minute drive.

Table 3-134. Supply and demand for hiking trails within a 30-minute drive from selected communities.

Community	County Participation Rate	Local User Population	Trail Miles	Trail Miles Per User
Coos Bay	40%	21,353	51	0.0024
Corvallis	54%	108,473	300	0.0028
Eugene	47%	160,078	73	0.0005
Grants Pass	46%	55,592	345	0.0062
McMinnville	46%	56,994	30	0.0005
Medford	47%	85,002	437	0.0051
Newburg	46%	236,095	187	0.0008
Portland	55%	773,649	298	0.0004
Roseburg	41%	39,120	66	0.0017
Salem	50%	213,239	326	0.0015
Sandy	45%	177,305	1,528	0.0086
Tillamook	34%	8,366	111	0.0133
1st Quartile	**44%**	**51,474**	**72**	**0.0007**
Median	**46%**	**96,737**	**242**	**0.0020**
2nd Quartile	**48%**	**186,289**	**330**	**0.0054**

Table 3-135. Supply and demand for hiking trails within a 60-minute drive from selected communities.

Community	County Participation Rate	Local User Population	Trail Miles	Trail Miles Per User
Coos Bay	40%	32,674	157	0.0048
Corvallis	54%	498,958	443	0.0009
Eugene	47%	305,863	846	0.0028
Grants Pass	46%	150,993	1,162	0.0077
McMinnville	46%	760,939	641	0.0008
Medford	47%	137,371	512	0.0037
Newburg	46%	963,756	901	0.0009
Portland	55%	1,136,424	2,142	0.0019
Roseburg	41%	73,796	859	0.0116
Salem	50%	937,711	928	0.0010
Sandy	45%	704,886	2,800	0.0040
Tillamook	34%	26,923	269	0.0100
1st Quartile	**44%**	**121,477**	**495**	**0.0010**
Median	**46%**	**402,411**	**853**	**0.0032**
2nd Quartile	**48%**	**805,132**	**986**	**0.0055**

Hiking trail miles per capita with respect to the local residential population within 30 minutes is lowest for Portland, followed by Eugene and McMinnville. At the 60-minute radius, McMinnville, Newburg, Corvallis, and Salem have the fewest hiking trail miles with respect to population. When available trail miles per capita for these communities are low increased visitor interactions can be expected to degrade the user experience near in these areas.

Mountain Bike Trails

The availability of all identifiable mountain bike trails (BLM and non-BLM) within 30-minute and 60-minute driving time of the selected communities varies, with Corvallis having the most trail miles available within 30 minutes and Sandy having the most trail miles available within 60 minutes (**Tables 3-136** and **3-137**). Based on the available trail data, mountain bike trails are generally scarcer for Salem and Tillamook than other communities when looking at a 30-minute drive.

Table 3-136. Supply and demand for mountain bike trails within a 30-minute drive from selected communities.

Community	County Participation Rate	Local User Population	Trail Miles	Trail Miles Per User
Coos Bay	11%	5,716	30	0.0052
Corvallis	17%	34,276	183	0.0053
Eugene	11%	36,811	11	0.0003
Grants Pass	10%	11,990	56	0.0047
McMinnville	9%	11,698	27	0.0023
Medford	14%	25,988	16	0.0006
Newburg	9%	48,456	42	0.0009
Portland	11%	159,198	47	0.0003
Roseburg	9%	8,554	15	0.0018
Salem	12%	50,348	9	0.0002
Sandy	7%	26,005	79	0.0030
Tillamook	11%	2,651	8	0.0030
1st Quartile	**9%**	**10,912**	**14**	**0.0005**
Median	**11%**	**25,996**	**29**	**0.0020**
2nd Quartile	**12%**	**39,723**	**49**	**0.0035**

Table 3-137. Supply and demand for mountain bike trails within a 60-minute drive from selected communities.

Community	County Participation Rate	Local User Population	Trail Miles	Trail Miles Per User
Coos Bay	11%	8,746	42	0.0048
Corvallis	17%	157,663	193	0.0012
Eugene	11%	70,336	284	0.0040
Grants Pass	10%	32,567	155	0.0048
McMinnville	9%	156,175	187	0.0012
Medford	14%	41,999	221	0.0053
Newburg	9%	197,801	202	0.0010
Portland	11%	233,849	225	0.0010
Roseburg	9%	16,137	147	0.0091
Salem	12%	221,404	170	0.0008
Sandy	7%	103,383	280	0.0027
Tillamook	11%	8,531	244	0.0286
1st Quartile	**9%**	**28,460**	**166**	**0.0012**
Median	**11%**	**86,859**	**197**	**0.0034**
2nd Quartile	**12%**	**167,698**	**230**	**0.0049**

Mountain bike trails per capita with respect to the local residential population within 30 minutes is lowest for Salem followed by Portland and Eugene. At the 60-minute radius, Salem, Newburg and Portland have the fewest mountain bike trails with respect to population.

Off-Highway Vehicle Trails

The availability of all identifiable OHV trails (BLM and non-BLM) within 30-minute and 60-minute driving time of the selected communities varies, with Grants Pass having the most trail miles available within both a 30-minute and 60-minute drive (**Tables 3-138,** and **3-139**). Based on the available trail data, OHV trails are non-existent for Eugene and Portland when looking at 30-minute distances.

Table 3-138. Supply and demand for OHV trails within a 30-minute drive from selected communities.

Community	County Participation Rate	Local User Population	Trail Miles	Trail Miles Per User*
Coos Bay	29%	15,853	-	-
Corvallis	10%	19,356	21	0.0011
Eugene	6%	19,925	-	-
Grants Pass	10%	12,354	177	0.0143
McMinnville	11%	13,440	58	0.0043
Medford	10%	18,589	89	0.0048
Newburg	11%	55,673	58	0.0010
Portland	2%	20,947	-	-
Roseburg	19%	18,551	53	0.0028
Salem	11%	44,848	2	-
Sandy	9%	34,673	80	0.0023
Tillamook	16%	3,989	58	0.0146
1st Quartile	**9%**	**15,250**	**2**	**0.0000**
Median	**10%**	**18,972**	**55**	**0.0017**
2nd Quartile	**12%**	**24,379**	**64**	**0.0044**

*The data does not reflect the Oregon Dunes National Recreation Area because the data was based on linear routes and the dunes are represented as a polygon.

Table 3-139. Supply and demand for OHV trails within a 60-minute drive from selected communities.

Community	County Participation Rate	Local User Population	Trail Miles	Trail Miles Per User*
Coos Bay	29%	24,258	124	0.0051
Corvallis	10%	89,033	22	0.0002
Eugene	6%	38,072	1	-
Grants Pass	10%	33,554	653	0.0194
McMinnville	11%	179,435	124	0.0007
Medford	10%	30,041	278	0.0093
Newburg	11%	227,261	150	0.0007
Portland	2%	30,770	168	0.0054
Roseburg	19%	34,994	243	0.0069
Salem	11%	197,217	119	0.0006
Sandy	9%	137,844	162	0.0012
Tillamook	16%	12,835	78	0.0061
1st Quartile	**9%**	**30,587**	**109**	**0.0006**
Median	**10%**	**36,533**	**137**	**0.0031**
2nd Quartile	**12%**	**148,242**	**186**	**0.0063**

*The data does not reflect the Oregon Dunes National Recreation Area because the data was based on linear routes and the dunes are represented as a polygon.

Off-highway vehicle trails per capita with respect to the local residential population within 30 minutes are lowest for Eugene and Portland. At the 60-minute radius, Eugene, Corvallis, and Salem have the fewest OHV trails with respect to population.

Overall, the alternatives increase RMA acreage progressively from Alternative A through D, although the changes in RMA acreage do not follow consistent patterns for all of the identified communities. Recreation opportunities that are close to population centers experience the most participants and visitor-days, and consequently result in the highest value for residents within the 12 study communities.

In all alternatives, in terms of proximity to the 12 target population centers, the overall acreage accessible within 30-minute and 60-minute driving distances under each alternative track with their overall RMA acreage. The communities with the least existing non-motorized and motorized trail miles within 30-minute proximities for the various recreation activities see some improvement under Alternatives C and D, while other communities with little trail mileage within 30 minutes would see substantial increase in RMA acreage under Alternatives C and D (**Table 3-140**). Moving out from 30-minute distances to 60-minute distances increase the recreation area acreage by more than double, and increases to five- or six-fold under Alternatives C and D. While all communities would see increased total RMA acreage progressively from Alternatives A through D, Grants Pass and Medford would experience the highest increase in RMA acreage under Alternatives C and D.

Table 3-140. Acres of RMAs by community and alternative within 30-minutes.

Community	Population Estimate	Alt. A	Alt. B	Alt. C	Alt. D
Coos Bay	53,921	-	-	-	479
Corvallis	201,622	17	141	407	285
Eugene	337,718	17	26	31	572
Grants Pass	121,116	5,098	3,797	29,546	31,517
McMinnville	124,442	-	15	15	15
Medford	180,471	32	5,706	21,364	20,845
Newburg	515,492	-	-	-	-
Portland	1,396,478	-	-	-	-
Roseburg	96,117	44	2,257	12,622	12,622
Salem	423,093	0	-	-	-
Sandy	394,012	602	1,559	5,490	6,640
Tillamook	24,321	-	-	86	86

When considering 60-minute distances, Alternative C provides an increase in RMA acreage with respect to the No Action alternative for all of the communities with the fewest current trail miles, and this pattern increases with Alternative D (**Table 3-141**). In terms of total trail mileage scarcity, Grants Pass and Medford see a particular increase with Alternatives C and D, while in terms of per capita trail mileage scarcity, Corvallis and Newburg would particularly benefit under Alternatives C and D at the 60-minute distance.

Table 3-141. Acres of RMAs by community and alternative within 60-minutes.

Community	Population Estimate	Alt. A	Alt. B	Alt. C	Alt. D
Coos Bay	82,511	289	2,956	3,226	3,584
Corvallis	927,432	72	12,581	20,062	24,109
Eugene	645,281	130	14,068	18,756	25,903
Grants Pass	328,960	9,589	18,937	159,806	192,068
McMinnville	1,661,439	14	6,652	11,084	15,600
Medford	291,658	10,749	24,361	163,742	199,365
Newburg	2,104,270	286	7,234	12,040	17,238
Portland	2,051,307	613	2,924	8,056	10,726
Roseburg	181,317	154	7,245	41,444	56,755
Salem	1,860,538	530	4,387	7,727	11,443
Sandy	1,566,414	605	3,090	8,226	11,469
Tillamook	78,264	18	7,041	9,545	14,693

Effects from the Management of Other Resources

The BLM expects effects to recreation to occur from wildland fire and fuels management, Special Status Species protections, forest management, trails and travel management, cultural resource protection, lands and realty actions, renewable energy development, special designations, riparian resources protections, mineral resource development, and livestock grazing management decisions. These resources or resource uses would have both short-term and long-term effects, based on the proposed management decisions.

Effects from Wildland Fire and Fuels Management

In all alternatives, fire suppression would protect high-value developed recreation resources, help maintain recreation opportunities, and protect recreation infrastructure over the long-term. Temporary closures of recreation facilities and areas could occur during and after fire events. Temporary closures could displace recreational users for the short-term. Temporary closures of public lands to implement fuels management prescriptions would prevent users from pursuing recreational activities in the short-term.

Emergency stabilization and rehabilitation efforts could have both short-term and long-term effects for recreational users. Some stabilization and rehabilitation efforts could require temporary closures to public recreation users. These closures would be short-term and require those seeking a recreational experience to travel to other areas. In the long-term, fire stabilization and rehabilitation efforts would restore the landscape and may improve wildlife habitat. Hunting, wildlife viewing, sightseeing, and nature photography opportunities could improve as natural landscapes are restored.

Effects from Forestry Management

In all alternatives, timber management would affect recreation opportunities in or outside RMAs by altering the physical Recreation Setting Characteristics. Over the long-term, timber activities would degrade an areas' naturalness if landscape design features were not incorporated to offset effects on the landscape. Road construction from timber harvest would result in additional vehicle routes and change the remoteness of the area. Access to and through the area may be improved if forestry roads were open to the public; however, the improved roads may provide no additional opportunities for OHV driving and riding and even displace visitors participating in trail-based activities. The Recreation Setting Characteristics section analyzes forest management effects to the physical characteristics of remoteness and naturalness.

Effects from Special Status Species Protections

Under all alternatives, the BLM would manage recreation to protect habitat for Federal threatened and endangered species. In all alternatives, recreation would be similarly affected by management for threatened and endangered species because law, direction, and policy require that listed species be protected.

Effects from Cultural Resource Protection

Managing public lands to protect cultural resources would have few, if any, effects on recreation use and management. Protection of cultural resources, and in many cases, interpreting or enhancing cultural sites, is a benefit to recreation users and visitors. The BLM would survey for and avoid archaeological sites and sites eligible for the National Register of Historic Places when identifying or planning potential recreation facilities.

Effects from Trails and Travel Management

Trails and travel management directly affect Recreation Setting Characteristics, recreation opportunities, and recreation outcomes. Travel designations, including the level of development and maintenance, influence recreation use and desired recreation settings.

The Trails and Travel Management section discusses area designations, limitations on public travel and access, and acres open to different types and modes of travel by alternative. An effect on specific recreation activities increases as the acres available to specific recreation activities decreases. However, a quality recreation opportunity has many more variables (i.e., naturalness, level of contact with other visitors, group size, level of management control, and level of maintenance) to consider. Pedestrian, mountain bike, and equestrian travel are not constrained by limiting designations for motorized activities.

Effects from Special Designations

Congressional actions or presidential proclamations that result in the designation of National Monuments, Wilderness, Wild and Scenic Rivers, or National Scenic or Historic Trails usually identify those areas as valuable for a variety of recreation activities. Existing Wilderness and Wilderness Study Areas preclude the construction of facilities for recreation management and the development of motorized and mechanized trails.

Designations made by the BLM through the land use planning process include, but are not limited to, ACECs and lands managed to protect their wilderness characteristics. These designations would protect many resources valuable for low impact or wildlife-based recreation such as hiking, nature study, or hunting. ACEC designations vary between alternatives and would not affect the distribution of RMAs. Effects to recreation and visitor services would be both adverse and beneficial, depending on the resource management decision.

Effects from Lands and Realty

The issuance of a right-of-way can change the physical Recreation Setting Characteristics of naturalness and remoteness, or effect developed recreation sites and trails, depending on the location of the corridor or development. In turn, the social and operational Recreation Setting Characteristics could also change. To avoid right-of-ways that could negatively affect the naturalness or remoteness of an area, the BLM can designate Right-Of-Way Avoidance Areas or Right-Of-Way Exclusion Areas. A right-of-way may not be entirely unavailable in an avoidance area but would not be permitted unless it is compatible with the protected values of the given area. The BLM cannot grant within exclusion areas unless required to by law.

Under all alternatives, in areas that the BLM does not designate as SRMAs or ERMAs, existing recreation opportunities and Recreation Setting Characteristics would be indirectly retained from the designation of Right-Of-Way Avoidance Areas and Right-Of-Way Exclusion Areas identified for other resources (e.g., wetlands, ACECs, and threatened and endangered species).

There BLM would not create Right-Of-Way Avoidance Areas specifically to protect recreation under Alternative A. Alternatives A and B would allow for the most change in Recreation Setting Characteristics from right-of-ways. Alternatives C and D would have the most acres in both Right-Of-Way Avoidance Areas and Right-Of-Way Exclusion Areas. **Table 3-142** provides a breakdown of Right-Of-Way Avoidance Areas and Right-Of-Way Exclusion Areas applied to RMAs by alternative.

Table 3-142. Right-Of-Way Avoidance Areas and Right-Of-Way Exclusion Areas by Recreation Management Area type.

Alternative	SRMA (Acres)	ERMA (Acres)	ROW Avoidance Area (Acres)	ROW Exclusion Area (Acres)
No Action	-	8,207	8,207	1,321
Alt. A	18,543	-	18,543	7,075
Alt. B	16,170	30,072	38,731	14,754
Alt. C	58,960	367,403	416,617	17,010
Alt. D	86,605	591,490	666,862	12,140

Effects from Visual Resource Management

In all action alternatives, the BLM would designate VRM class II to maintain the existing visual quality throughout the decision area and protect unique and fragile resource values such as those found in RMAs. **Table 3-143** depicts the acres of VRM classes assigned to RMA by alternative. The physical Recreation Setting Characteristics of the other RMAs have been retained, and would continue to be retained, by the Class I and Class II designations, or have been somewhat impacted by Class III and Class IV designations.

Table 3-143. Acres of Visual Resource Management Class by Recreation Management Area.

Visual Resource Inventory Classes	No Action (Acres)	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)	Alt. D (Acres)
Class I	22,165	-	-	-	-
Class II	125,220	17,814	52,661	142,848	200,022
Class III	633,537	1,274	35,273	106,496	170,508
Class IV	1,691,128	975	76,349	167,418	296,295
Blank	6,812	2	11	55	327
Totals	**2,478,862**	**20,065**	**164,294**	**416,817**	**667,152**

Across all alternatives, areas designated as Visual Resource Management (VRM) Class I provide the most protection to the physical RSCs. The character of the landscape in VRM Class I or II areas are maintained, which retains the existing degree of naturalness. Moderate to major modifications to the character of the landscape could occur in areas designated as VRM Class III or IV. Visually evident effects may alter the RSC and at some levels impair the visitors' recreation experience.

At the implementation level, recreation projects in VRM Class I and Class II areas would mitigate for scenic values through appropriate design. Any changes to the landscape would need to repeat the basic elements of form, line, color, and texture found in the natural features of the landscape. Alternatives C (142,848 acres) and D (200,002 acres) have the largest amount of Recreation Management Areas assigned to VRM Class II. Alternatives A (17,814 acres) and B (52,661 acres) have the smallest amount of Recreation Management Areas assigned to VRM Class II.

Issues considered but not analyzed in detail

How would BLM management affect significant caves?

The Federal Caves Resources Protection Act (16 U.S.C. 4301) defines a cave as significant if it meets at least one of the following criteria: size, mineral formations, endemic or other unusual species or subspecies, seasonally important habitat for non-endemic species or subspecies, archaeological or paleontological site, historical or religious significance, hydrologic connectivity to other caves or springs, unusual geologic strata or processes, recreationally important, or pristine in that human contact has been minimal or nonexistent.

The BLM has designated five caves within the decision area as significant under this Act. All of these caves are in the Medford District: three in the Grants Pass Field Office and two in the Butte Falls Field Office. The size and extent of these caves are unknown.

Under all alternatives, the BLM would continue to apply current management to protect the resources associated with these caves and protect visitor safety. All alternatives would maintain conditions at significant caves, and there would be no meaningful difference among the alternatives.

How would BLM management affect public health and safety at Formerly Used Defense Sites (FUDS)?

The decision area includes a portion of one Formerly Used Defense Site (FUDS): the Modoc Aerial Gunnery and Bombing Range (Modoc Range), which is located in Modoc County, California, and Klamath and Lake Counties, Oregon. The estimated acreage of the Modoc Range varies depending on the source of the information, but it covers between 623,328 and 2,872,000 acres in Southern Oregon and Northern California, most of which is outside of the planning area. The Modoc Range was constructed by the Navy in the 13th Naval District during World War II. Prior to the 13th Naval District operations at the site, the predominant land use was agricultural for forestry and livestock grazing. The Modoc Range was associated with the Naval Air Station, in Klamath Falls, and was used as a practice area for aerial gunnery, bombing, and strafing. Currently, the majority of the land comprising the Modoc Range is managed by the U.S. Forest Service, U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, and the BLM, and is mostly used for recreational purposes.

The Army Corps of Engineers MODOC Aerial Gunnery and Bombing Range Site Inspection Report (2009) indicates that the BLM has two Munitions Response Sites within the planning area, which are potentially affected with munitions and explosives of concern. These sites were Navy bomb target areas that may present an explosive risk. The affected BLM-administered lands are located at two recreation sites: Gerber Lake Reservoir (937 acres) and Willow Valley Lake (649 acres). These lakes were used as practice bombing targets for approximately 15 months in the 1940s, with targets set at the center of the lakes. Munitions debris (non-explosive remnants) from practice bombs have been found on the shores of the lakes and on an island in Gerber Lake. Although the munitions used in bombing were practice, these rounds originally had spotting charges and other energetic components that could potentially represent an explosive hazard if they did not function properly upon impact. Until Unexploded Ordinance-trained technicians inspect the munitions, certify them as safe, and remove them from the site, all munitions are presumed to be a hazard. The Army Corps of Engineers has scheduled additional investigations at these two locations in 2021 to assess hazardous materials, explosives, and explosive remnants. Based on current information, the two sites on BLM-administered lands in the decision area are considered low risk compared to others in the FUDS Inventory, with a score of 6 out of 9 (with 1 being the highest risk and 9 the lowest risk). However, the investigation and cleanup of the sites and the eventual remedy may affect recreational use over the long-term, depending on the risks identified. Discovery of munitions at any time may result in a change in the schedule to address these areas and an increase in the need for site access controls.

Under all alternatives, the BLM would apply the same management to protect public health and safety in the portion of the Modoc Range within the decision area. All alternatives would maintain conditions at the Modoc Range, and there would be no meaningful difference among the alternatives that the BLM can discern at this scale of analysis with the information available to the BLM.

Socioeconomics

Key Points

- BLM-administered lands provide a wide variety of market and non-market goods and services to the planning area such as timber, recreation, carbon storage, minerals, and source water protection.
- The annual harvest value of timber, compared to $23 million in 2012, would increase under all alternatives (first decadal average), from $37 million under Alternative D to $135 million under Alternative C.
- Using non-market valuation techniques the analysis estimates the 2012 value of recreation on BLM-administered lands at $223 million and the annual value of net carbon storage at $99 million. Under all alternatives (first decadal average), the annual value of recreation would increase to $250 million. The annual value of net carbon storage would increase under all alternatives except Alternative C, under which it would fall to $55 million. Under Alternative D, the value would be $233 million.
- The BLM contributes economically to all parts of the planning area, triggered by the production and use of commodities such as timber and other forest products, personal and commercial use of BLM-administered lands, expenditures for personnel, materials, and services, and Federal payments to State and local governments. These contributions trigger effects that find their way into virtually every industry of the local economy.
- In 2012, BLM management contributed 7,900 jobs and $355 million in earnings to the planning area, which is about 0.4 percent of the total jobs and earnings. Under the alternatives, these contributions would range from a low of 6,900 jobs and $304 million in earnings (Alternative D) to a high of 12,419 jobs and $584 million in earnings (Alternative C).
- BLM management contributes the greatest share of local area employment and earnings in the Roseburg and Coos Bay Districts (from 2.9 percent to 3.8 percent in 2012). Under Alternatives A, B, and D, these districts would experience losses in BLM-based jobs.
- There is uncertainty regarding the source and amounts of future payments to counties from activities on BLM-administered lands. Payments under the Secure Rural Schools and Community Self-Determination Act (SRS) have not been authorized beyond 2014.
- SRS payments to counties totaled $38 million in 2012. Had payments in 2012 been based on the O&C Act formula, they would have been $12 million. Under the alternatives, assuming payments were based on the formula in the O&C Act, payments in 2018 would range from a low of $19 million under Alternative D, to a high of $67 million under Alternative C.
- Over the long-term (1969-2007), timber-based industries nationally exhibited low or negative growth rates with high volatility compared with the United States economy as a whole, indicating that these industries tend to be inherently volatile. Increases in timber industry activity in the planning area could bring additional exposure to greater economic instability.
- Currently, cities in the northern part of the planning area generally have higher capacity and resiliency (ability to face changes and meet needs) compared to cities in the southern part of the planning area. Larger cities tend to have higher capacity and resiliency. Alternatives B and C would, overall, make the strongest contributions to community capacity and resiliency with positive benefits to nearly all communities. Alternative D would have the smallest effect on community capacity and resiliency.
- Environmental justice analyses suggest that employment effects to low-income populations in Coos, Curry, Douglas, and Klamath Counties would be disproportionately negative under Alternatives A and D. Low-income communities and Tribes in these counties would be

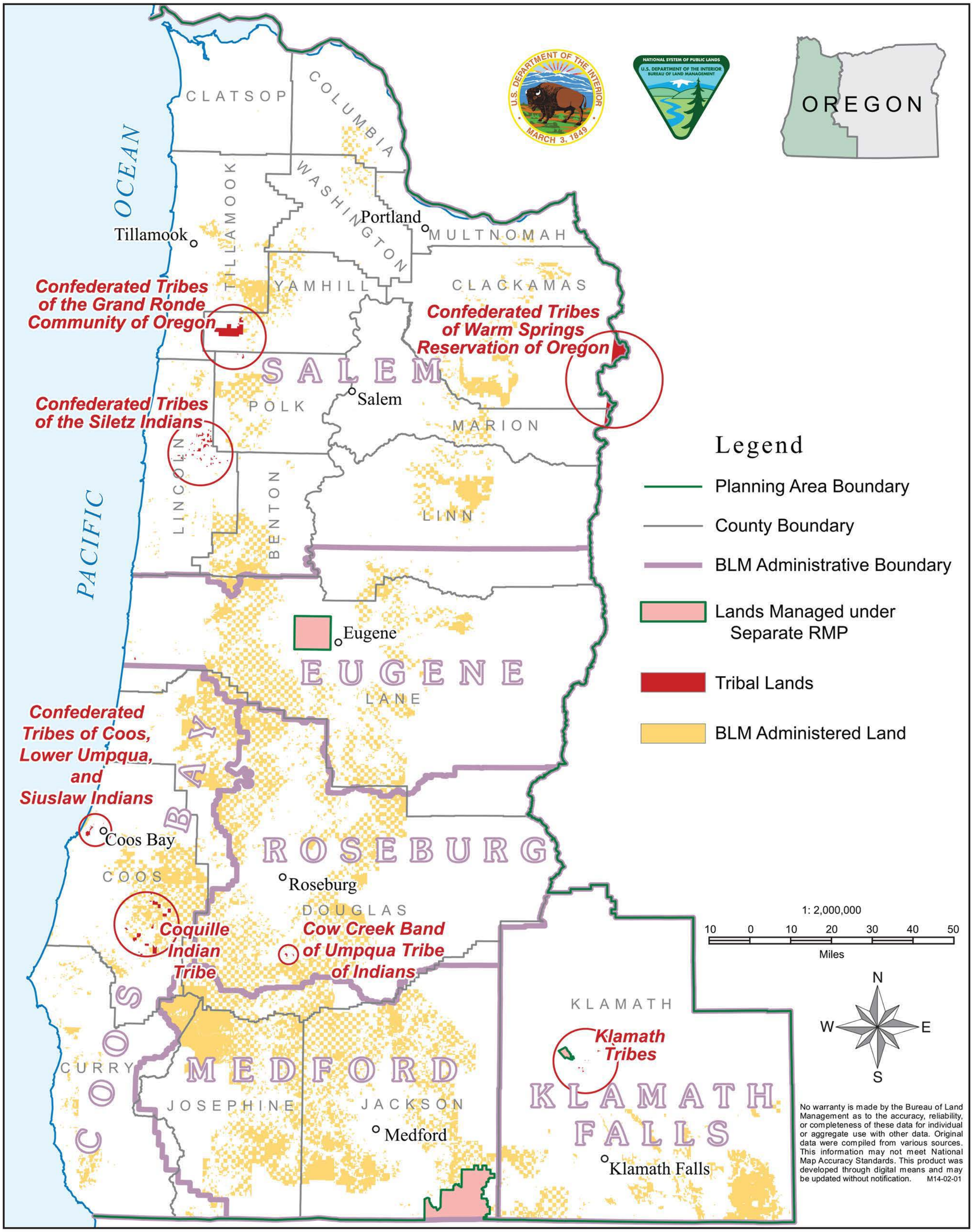
vulnerable to these disproportionately negatively effects. Under Alternative B, employment effects would be disproportionately negative for Coos and Curry Counties.

Background

The analysis of socioeconomic resources has two broad emphases: economic growth and stability; and social capacity and resiliency. To address these topics, the BLM assessed the value of goods and services derived from BLM-administered lands, economic activity in the planning area, county payments, economic stability, the capacity and resiliency of communities, and environmental justice. The section also describes the cost to the BLM to implement the alternatives.

Geography and Population

The planning area contains nineteen counties in western Oregon. For several BLM districts, the district boundaries are generally consistent with county boundaries, with most of the area of each county in one BLM district. The planning area also contains the lands of seven Federally-recognized Indian Tribes (**Map 3-5**).



Map 3-5: Counties, BLM Administrative Boundaries, and Tribal Lands within the Planning Area

As of 2012, the planning areas' population was approximately 3.4 million or 88 percent of the State's total population (**Table 3-144**). The population of the twelve counties in the BLM's Salem District is almost 2.5 million, almost 75 percent of the planning area population. All of the counties in the planning area have experienced some level of population growth from 1990-2000 and from 2000-2012. However, only four counties' growth rates was higher than the State of Oregon since 2000 (12 percent): Linn, Polk, Washington, and Yamhill. All of these are in the BLM's Salem District. Several counties have experienced very little recent growth (less than 2,600 people). These tend to be the more geographically isolated parts of the planning area: Clatsop, Tillamook and Lincoln counties in the northwest, Curry and Coos counties in the southwest, and Klamath County in the southeast.

Table 3-144. Planning area population, 1990 to 2012.

Geography	Population				Population Change, 1990-2012		Population Change, 2000-2012	
	1990	2000	2010	2012	Number	%	Number	%
Oregon	2,842,321	3,421,399	3,831,074	3,836,628	994,307	35%	415,229	12%
Planning Area	2,535,122	3,033,622	3,387,980	3,393,160	858,038	34%	359,538	12%
Benton County	70,811	78,153	85,579	85,501	14,690	21%	7,348	9%
Clackamas County	278,850	338,391	375,992	377,206	98,356	35%	38,815	11%
Clatsop County	33,301	35,630	37,039	37,068	3,767	11%	1,438	4%
Columbia County	37,557	43,560	49,351	49,317	11,760	31%	5,757	13%
Coos County	60,273	62,779	63,043	62,937	2,664	4%	158	0.3%
Curry County	19,327	21,137	22,364	22,344	3,017	16%	1,207	6%
Douglas County	94,649	100,399	107,667	107,391	12,742	13%	6,992	7%
Jackson County	146,389	181,269	203,206	203,613	57,224	39%	22,344	12%
Josephine County	62,649	75,726	82,713	82,636	19,987	32%	6,910	9%
Klamath County	57,702	63,775	66,380	66,350	8,648	15%	2,575	4%
Lane County	282,912	322,959	351,715	351,794	68,882	24%	28,835	9%
Lincoln County	38,889	44,479	46,034	45,992	7,103	18%	1,513	3%
Linn County	91,227	103,069	116,672	116,871	25,644	28%	13,802	13%
Marion County	228,483	284,834	315,335	315,391	86,908	38%	30,557	11%
Multnomah County	583,887	660,486	735,334	737,110	153,223	26%	76,624	12%
Polk County	49,541	62,380	75,403	75,448	25,907	52%	13,068	21%
Tillamook County	21,570	24,262	25,250	25,254	3,684	17%	992	4%
Washington County	311,554	445,342	529,710	531,818	220,264	71%	86,476	19%
Yamhill County	65,551	84,992	99,193	99,119	33,568	51%	14,127	17%
Lands of Federally-Recognized Tribes Within the Planning Area								
Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians of Oregon (Coos County)	4	25	47	24	20	500%	-1	-4%
Confederated Tribes of Grand Ronde Community of Oregon (Yamhill County)	57	55	434	473	416	730%	418	760%
Confederated Tribes of Warm Springs Reservation of Oregon	3,076	3,314	4,012	3,960	884	29%	646	19%
Coquille Tribe of Oregon (Coos County)	See note	258	323	297	See note		39	15%
Confederated Tribes of the Siletz Reservation (Lincoln and Polk Counties)	5	308	506	476	471	9420%	168	55%
Cow Creek Band of Umpqua Indians of Oregon (Douglas County)	58	22	104	21	-37	-64%	-1	-5%
Klamath Tribes, Oregon (Klamath County)	See note	29	26	17	See note		-12	-41%

Sources:
U.S. Census Bureau; 1990 Census of Population and Housing Public Law 94-171 Data Age by Race and Hispanic Origin, (Official), http://censtats.census.gov/cgi-bin/pl94/pl94data.pl (accessed 9-17-2014).
U.S. Census Bureau; 2000 Census of Population and Housing Summary File 1.
U.S. Census Bureau; American Community Survey, 2010 Census Restricting Data, Table DP05; American FactFinder; http://factfinder2.census.gov ; (July 2014).
U.S. Census Bureau; American Community Survey, 2012 American Community Survey 5-Year Estimates, Tables DP03, DP04, DP05, S1901 and S1701; American FactFinder; http://factfinder2.census.gov ; (July 2014).
Notes:
In 1990, the Coquille Tribe and the Klamath Tribes did not have a legally established land base. The 1990 Census gives data for a Tribal Designated Statistical Area (TDSA) that is a much larger area than the 2012 Reservation and Off-Reservation Trust Lands with approximately 5,500 American Indian and Alaska Native persons in the Coquille TDSA and approximately 1,850 in the Klamath TDSA.
The County totals include the populations of lands of federally-recognized tribes, but the table shows them separately for clarification.

The lands of seven Federally-recognized Indian Tribes range in size from a few dozen acres (i.e., the reservation and off-reservation lands for the Coos/Lower Umpqua/Siuslaw Tribes) to more than 18,000 acres (the Warm Springs reservation is nearly 650,000 acres; of which approximately 18,000 acres are within the planning area).

Some of the Tribal lands had large population percentage increases between 1990 and 2012, but this is because the base population in 1990 was very low, or, in the cases of the Coquille Tribe and the Klamath Tribes, because the land base had not yet been established. **Table 3-144** includes only the population living on Tribal lands and not the entire Tribal membership population, which may be considerably larger.

Projected Growth

Since 1950, Oregon's population has increased at a faster pace than the U.S. population as a whole. Between 1950 and 2010 Oregon's population increased by 150 percent, whereas the United States' population increased by 104 percent. The 2007 to 2009 recession hit Oregon harder than many other states, reducing net migration and slowing Oregon's population growth. As of 2012, Oregon's growth rate was below the national growth rate. However, Oregon's growth rate is expected to rise higher than the U.S. growth rate (Vaidya 2012).

Between 2010 and 2030, the State's Office of Economic Analysis projects that the population of the planning area will be approximately 4.2 million, an increase of approximately 832,000. The State projects that approximately 80 percent of this increase will be in the twelve counties in the BLM's Salem District (State of Oregon 2012). The State does not currently prepare population projections for geographies below the county level, such as cities.

Distressed Areas

The State of Oregon Business Development Department conducts economic assessments to determine which counties, cities, communities, or other geographic areas qualify as "distressed."

Pursuant to Oregon Administrative Rules (OAR) 123-024-0031, the Department defines "distressed" areas based on indicators that take into account unemployment rates, per capita personal income, change in average covered payroll per worker over 3 years and change in the county's weighted average employment change over 2 years. As of March 2014, the Department identifies as distressed twenty-four of Oregon's thirty-six counties (and all geographic areas within a designated county). Of the nineteen planning area counties, the Department identifies fourteen as distressed, and only Benton, Clackamas, Multnomah, Washington and Yamhill Counties are not identified as distressed (Business Oregon, 2014, contains the listing and the methodology).

Within the non-distressed counties, the Department has identified the following cities and places as distressed:

Benton:	Albany, Alpine CDP,[66] Alsea CDP
Clackamas:	Barlow, Estacada, Johnson City, Molalla, Oregon City, Sandy
Multnomah:	Fairview, Gresham, Troutdale, Wood Village
Washington:	Cornelius, Forest Grove
Yamhill:	Amity, Carlton, Dayton, Lafayette, McMinnville, Sheridan, Willamina

[66] Census Designated Places (CDPs) are settled concentrations of population that identifiable by name but are not legally incorporated under the laws of the state in which they are located. State and local officials and the Census Bureau delineate CDPs cooperatively.

Of these twenty-two cities and places, all but six meet the minority or income criteria for environmental justice. Socioeconomic Issue 6 - Environmental Justice contains more information.

In 2012, the Oregon Secretary of State identified eight counties, all in the planning area, whose financial condition may indicate a higher risk of distress than other counties: Coos, Curry, Douglas, Jackson, Josephine, Klamath, Lane, and Polk (Oregon Secretary of State 2012).

Issue 1

How would the alternatives affect the supply, demand, and value of goods and services derived from BLM-administered lands?

Summary of Analytical Methods

This analysis describes the socioeconomic contribution of the goods and services derived from BLM-administered lands in western Oregon under each alternative. **Table 3-145** shows the categories of goods and services included in this analysis.

Table 3-145. Goods and services derived from BLM-administered lands in western Oregon.

Goods and Services	Method of Valuation	
	Market	Non-Market
Timber	X	
Recreation and Visitation		X
Special Forest Products	X	X
Sustainable Energy Production	X	
Livestock Grazing	X	
Minerals	X	
Net Carbon Storage		X
Source Water Protection		X
Biodiversity and Sensitive Species		X
Scenic Amenities		X
Cultural Meaning		X

Source: USDI BLM 2014

BLM management activities affect the supply of the goods and services that BLM-administered lands provide, in terms of both quality and quantity. Changes in the supply interact with current and expected future demand for each good or service which affects the economic value of each good or service. The analysis expresses the value of each good or service in terms of market prices or in non-market values, as indicated in **Table 3-145**.

General Methodology for Estimating Supply, Demand, and Value

In this analysis, the BLM describes the past and current condition of each good and service, and incorporated the following information:

- Supply of the good or service, in terms of both quantity and quality
- Demand for the good or service
- Market price or non-market value of the good or service

In determining value, the BLM considered both use and non-use values of goods and services. Use values arise from the consumption of a resource and are typically (though not always) revealed through market transactions. Market activity does not typically reflect non-use values associated with BLM-administered lands, so market prices are not available to reveal their value. In these cases, the BLM relied on non-market techniques to estimate or describe economic value.

This methodology is consistent with Federal guidelines for conducting economic analyses (USDI BLM 2005, 2013a, 2013b, CEQ 2013, EPA 2010). The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014, pp. 130-134). The BLM is reporting all values in 2012 dollars unless otherwise noted.

The supply description of each good or service relies on information from BLM resource programs; other sections in this chapter contain much of this information. To streamline the discussion, this section summarizes that information and refers to the appropriate section for more detail.

Other sources of supply for forest-based goods and services exist in Oregon besides those available from BLM-administered land in the planning area. For example, the forestland on BLM-administered land in the planning area (approximately 2.4 million acres) accounts for approximately 8 percent of total forestland in Oregon (approximately 30.5 million acres, Oregon Department of Forestry, no date). The BLM-administered land in the planning area includes approximately 13 percent of the total number of acres in western Oregon in designated Wild and Scenic River areas and approximately 4 percent of designated Wilderness (TNS and WSC 2012).

The demand assessment for each good or service relies on information from the BLM, the U.S. Forest Service, and economic and related literature, such as journal articles and professional reports. The types of information that describe demand vary by good or service, but generally includes user counts, permit counts, goods produced, patterns of use, and other evidence from people who directly or indirectly interact with the good or service.

Methodology for Estimating Market Values

The analysis reports both fair market values, as revealed by market prices, and BLM revenue as data are available. The BLM collects revenue from the harvest or use of many of the goods and services in **Table 3-145**. Revenue is an indication of the value of the good or service, but may not capture the full market value of the good or service, for the following reasons:

- The BLM permit or sale price (and thus collected revenue) is set below market value
- The BLM does not collect revenue for all goods or services harvested or used in a particular category, in some cases legitimately, and in other cases because illicit harvest occurs

The value assessment of each good or service relied on information from the BLM regarding permit and market prices, and, where BLM data does not reflect market prices, the assessment relied on external information about commodity prices. The data sources and methods of valuation of each market-based good or service are described in more detail below.

Methodology for Estimating Non-market Values

The BLM assessed the economic importance of some goods and services using non-market values (see **Table 3-145**). As the name implies, nonmarket goods and services are not traded in markets. As a result, it is not possible to calculate how BLM actions could affect the values of these goods and services using market prices. Instead, when sufficient data are available, the analysis used non-market values to estimate their economic importance. If data are not available to estimate a dollar value, the analysis relied on other information to describe their economic importance, without monetary quantification. The BLM (USDI BLM 2013a) describes non-market values and methods of incorporating them in socioeconomic analyses for resource management plans.

Two broad categories of non-market values exist: use values and non-use or passive use values. People enjoy use values when they make use of the environment, such as through fishing, hunting, boating, or bird watching. Unlike other use values (e.g., from the production of commodities), these activities are usually not captured through market transactions. Non-use values reflect value derived in a manner other than using natural resources. Existence value is a type of non-use value that describes the value that society places on the existence of a species, place, or habitat. For example, people may be willing to pay to protect a wilderness area, even though they have no plans to visit the area (King and Mazzotta 2000).

In this analysis, the BLM did not attempt to estimate values for non-market goods and services on BLM-administered lands directly. Instead, the analysis relied on unit values from studies of similar goods and services, and applied the unit values as appropriate for goods and services on BLM-administered land. This technique, known as benefit transfer, provides a method for valuing non-market goods and services when data or resources are limited (EPA 2010).

Where data describing the amount or unit value of goods and services are not available, the analysis used several types of information to indicate economic importance qualitatively:

- Values of similar goods and services studied elsewhere
- Surveys of people’s preferences and actions
- Values of substitute goods and services

Valuation Methodologies for Specific Goods and Services

Timber

Analysis of the economic value of timber harvested on BLM-administered land involved the input of economic and forestry data and modeling. The BLM developed data sets describing the costs of the various logging techniques and other costs associated with timber sales based on current data. Stumpage prices provided the basis for the timber revenue estimates. These prices rely on the long-term trend for timber prices in western Oregon. **Appendix O** contains more detail regarding the price projection methodology. The BLM developed a timber harvest model within the Woodstock software platform to project harvest volumes by grade, species type, district, and other parameters for each alternative, including the No Action alternative. The model outputs, all in 2012 dollars, provide detail on the harvest volumes, costs, and revenues in 10-year blocks.

The BLM also developed a model to project the effects of changes in BLM harvests on private timber producers in the western Oregon timber market.

Recreation and Visitation

The assessment of the economic value of recreation on BLM-administered land in the planning area required consideration of the BLM’s recreation management under each alternative, the overall supply of recreation resources in the planning area, the user population, and how changes in supply could address scarcities that would increase usage and benefit. The BLM’s Recreation Management Information System (RMIS) provides estimates of visitor days and numbers of participants. The BLM combined this information with spatial data on its own recreation areas and other public recreation access, as well as census data on population. In this way, the BLM identified the nearby populations that use BLM recreation resources and how these opportunities relate to other opportunities. The BLM also considered the estimates for total outdoor recreation activity in western Oregon using survey data from Oregon's Statewide Comprehensive Outdoor Recreation Plan (SCORP) and use estimates and benefit estimates per visitor day and activity day developed by the U.S. Forest Service.

The BLM considered all these data and calculated consumer surplus values, which represents the net economic benefit to a participant in recreation activity after deducting market-based costs associated with the activity. Consumer surplus values are non-market values. They do not represent dollars exchanged, but, rather, the amount of net benefit beyond expenditures that represent additional willingness-to-pay.

To compare the alternatives, the BLM identified the acreage of Recreation Management Areas (RMAs) designated under each alternative. The BLM compared the overall and district-level change in total RMA acreage by RMA. The BLM then identified the change in RMA acreage within 30-minute and 60-minute proximities of twelve major communities in western Oregon. Recognizing that quality, accessibility, and (low) congestion all contribute to demand for recreation opportunities and resulting value, the BLM compared the changes in accessible RMA acreage, and the proportional relationships between these changes and estimates of current recreation-oriented areas. The BLM considered how these proportional changes in recreation acreage correspond to existing conditions and existing estimates of recreation value from BLM-administered land. The BLM applied the projections for growth and composition of outdoor recreation participation over the next 50 years to the consumer surplus values to estimate the net present value of outdoor recreation visitor-days to participants over that period.

Special Forest Products

This analysis focused on special forest products from forested areas. Non-forested areas may produce goods akin to these forest products that have value (e.g., sagebrush). However, the BLM assumed in this analysis that non-forested areas would remain non-forested under all alternatives, so there would be no change in the supply or value of these goods.

The Forest Management section in this chapter describes the supply of special forest products in terms of acreage suitable for the production of Category I[67] and Category II species. Category I species thrive in disturbed forest conditions, and Category I species rely on undisturbed forest conditions. This section reports acreages for two areas: the "coastal/north" areas (Coos Bay, Eugene, and Salem Districts) and the "interior/south" areas (the Roseburg and Medford Districts, and the Klamath Falls Field Office).

The analysis describes the demand for special forest products using data derived from the BLM harvest database, reviews of the literature, and interviews with BLM district staff. The harvest database reports quantity of special forest products collected by species, number of permits issued, and revenue collected. The analysis relied on interviews to understand the harvest database and better understand patterns of use and markets for special forest products.

The analysis reports both market prices and BLM revenue to describe value of special forest products. The harvest database reports BLM-collected revenue for special forest products. The analysis supplemented this information with information from the literature on market prices for special forest

[67] These categories are not a formal designation but simply a way to characterize similar special forest products for ease of analysis.

products. The literature indicates that BLM prices for special forest products are often below fair market value, so the analysis provides data for market values of special forest products when available.

Sustainable Energy Production

The BLM estimated the supply of sustainable energy resources within the decision area based on information provided in the Sustainable Energy section. The analysis describes the demand for sustainable energy using information from government reports and professional literature, as well as information from the BLM database on special forest products. Two categories of special forest products reported in the database are relevant for sustainable energy production: biomass and fuelwood. Information on the value of biomass energy production came from revenue data collected by BLM and from data from the U.S. Energy Information Administration.

Livestock Grazing

The BLM estimated the supply of livestock grazing within the decision area based on information provided in the Grazing section in this chapter. The analysis describes the demand for livestock grazing using information about the utilization of available livestock grazing allotments. Information on the value of livestock grazing came from Federal grazing fees and from market prices for private and State livestock grazing fees and forage.

Minerals

The BLM estimated the supply of saleable minerals within the decision area for the affected environment and effects analyses based on information provided in the Minerals section. The economic analysis described the current demand for minerals using information from a BLM database of mineral material sales. The analysis relied on data included in the database about the value of each sale. The BLM sells mineral material at fair market value, so the analysis did not incorporate additional information about the market value of mineral materials. In this analysis, the BLM assumed that demand would not change from current conditions and that the BLM would continue to sell mineral materials at fair market value.

Carbon Storage

The BLM estimated carbon storage and emissions in the Climate Change section in this chapter. The carbon storage reported in that section is “net carbon storage” representing carbon stored less carbon emitted through wildfire, prescribed burning, decomposition, and through the lifecycle of wood products. Other sources of emissions (e.g., enteric fermentation) are minor and are discussed in Issue 2 of the Climate Change section.

In this economic analysis, the BLM calculated the annual amount and value of net carbon storage based on the Climate Change section. To estimate value, the analysis used values developed by the U.S. Interagency Working Group on Social Cost of Carbon (SCC). Estimating SCC is complex, reflecting a variety of models and assumptions in climate science, ecology, and economics projected decades into the future, all involving uncertainties. The Interagency Working Group provides several estimates of SCC that are dependent on three variables:

- The year emissions are expected to occur
- The discount rate (2.5 percent, 3 percent, and 5 percent)
- The estimated severity of future damages

The Interagency Working Group estimates consider two scenarios of damage. The “Average” case reflects the average costs across climate models and socioeconomic scenarios. The “95th percentile” case reflects higher than average damages that might occur, but that have a probability of future occurrence of 5 percent.

To estimate the value of the stored carbon on BLM-administered land in 2012 for the affected environment, the analysis used the Interagency Working Group estimates for emissions in year 2015, a 3 percent discount rate, and both the average and 95th percentile cases. According to the Interagency Working Group, the estimated social cost per metric ton of carbon dioxide emitted in 2015 in 2007 dollars is $37 (average) and $109 (95th percentile case). These dollar values apply to carbon dioxide (CO_2), but net stored carbon is estimated in terms of tons of carbon (C). The BLM analysis converted dollars per metric ton of CO_2 to dollars per metric ton of C using a conversion factor of 3.67. The BLM converted dollar values to 2012 dollars using the GDP deflator. The final per ton values multiplied by metric tons of net stored carbon are $146.73 (average) and $432.22 (95th percentile case). The analysis presents both estimates to illustrate the uncertainty about SCC due to uncertainty of the damage caused by carbon emissions. However, they do not represent the full range of possible SCC estimates that would be based on other discount rates or cost assumptions. Of the two estimates presented, the BLM considers the “average” scenario to be more likely.

To estimate the value of the effects of alternatives on net stored carbon, the analysis used a similar procedure. Using the results of the effects analysis presented in Issue 1 of the Climate Change section, the economic analysis calculated the marginal change in stored carbon between 2013 and 2023 and between 2013 and 2113 by alternative. The estimated social cost per metric ton of CO_2 for emissions in year 2017 (the midpoint of the first decade) is $39 (average) and $116 (95th percentile) in 2007 dollars. These values were converted to dollars per metric ton of C and to 2012 dollars as described above, and were applied to the marginal change in net stored carbon over the first decade. After conversions to dollars per metric ton of C and to 2012 dollars, the estimated social cost per metric ton of C in year 2017 is $154.65 (average) and $459.96 (95th percentile). The estimated value of the marginal change over the 100-year period of analysis was calculated using the social cost per metric ton for emissions in year 2050 (the last year for which SCC is calculated by the Interagency Working Group). The estimated social cost per metric ton of CO_2 for emissions in year 2050 is $71 (average) and $220 (95th percentile case) in 2007 dollars. After conversions to dollars per metric ton of C and to 2012 dollars, the estimated social cost per metric ton of C in year 2050 is $281.53 (average) and $872.36 (95th percentile case).

Source Water Protection

The BLM estimated the supply of land that produces water potentially used for drinking water in the AMS (USDI BLM 2013). The economic analysis describes the current demand for source water protection using information derived from agreements between the BLM and state and local governments, and spatial information developed by the Wild Salmon Center and the Nature Conservancy. Qualitative information on the value of source water came from the professional literature. In this economic analysis, the BLM assumed that the quantity and quality of the supply of water available for drinking would not change from current conditions and necessarily would meets all State and Federal drinking water standards. The Hydrology section contains more information on effects on water quantity and quality.

Biodiversity and Sensitive Species

The BLM estimated the current conditions and effects on forest structure and threatened and endangered species in Forest Management, Fisheries, Wildlife, and Rare Plants and Fungi. The economic analysis describes the demand and value for biodiversity and sensitive species using information derived from the professional literature, and laws and regulations governing environmental protection. Although the professional literature includes some quantitative estimates of willingness to pay for protection of species and their habitat, insufficient information is available at the scale of analysis to produce quantitative estimates of the specific economic value or changes in value that would result from the alternatives.

Scenic Amenities

The BLM estimated the supply of scenic amenities within the planning area based on information provided in the Visual Resource Management section in this chapter. The economic analysis derived changes in supply under each alternative based on visual resource inventory acreage in each class of visual quality and visual resource management. The analysis describes the demand for scenic amenities and their value using information from professional, peer-reviewed literature. Insufficient information is available at the scale of analysis to produce quantitative estimates of the specific economic value or changes in value associated with scenic amenities that would result from the alternatives.

Cultural Resources

The BLM estimated the supply of cultural resources within the decision area based on information provided in the Cultural Resources section. The economic analysis describes demand for and value of cultural resources based on laws and regulations governing archaeological sites and cultural artifacts and descriptions of non-physical elements of cultural importance based on the framework for cultural meaning outlined in the United Nations' Millennium Ecosystem Assessment (Sarukhán and Whyte 2005). Insufficient information is available at the scale of analysis to produce quantitative estimates of the economic value or changes in value associated with changes in cultural resources by alternative.

Affected Environment

Timber

Supply

Western Oregon continues to be a national leader in the production of timber and timber products. The Timber and Socioeconomic sections of the Analysis of the Management Situation (USDI BLM 2013c, pp. 2-98 to 2-99 and 2-120 to 2-128), and the Forest Management section in this chapter provide information on the overall market supply and conditions. The past 50 years have seen dramatic changes in timber harvest for western Oregon, particularly from Federal lands including BLM-administered land. **Figures 3-141** and **3-142** show the declines in both volume and, over the past 50 years, in prices. These changes provide the context for assessing the economic consequences of possible changes in timber management on BLM-administered lands.

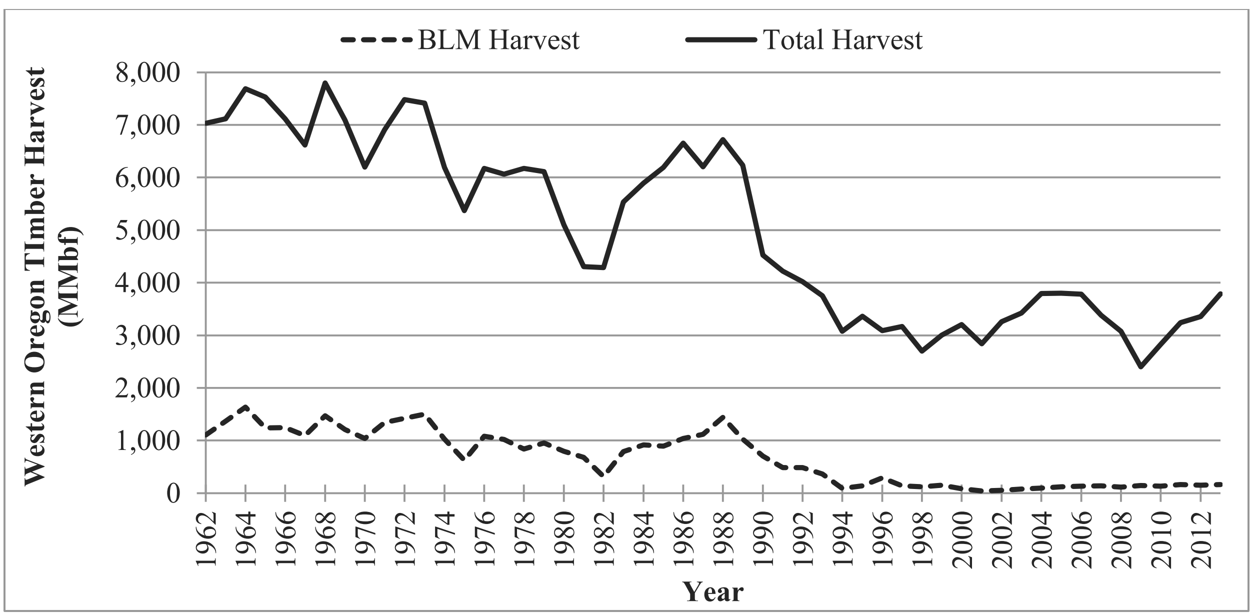


Figure 3-141. Western Oregon historical timber harvest, BLM and total (Source: Zhou and Warren 2012).

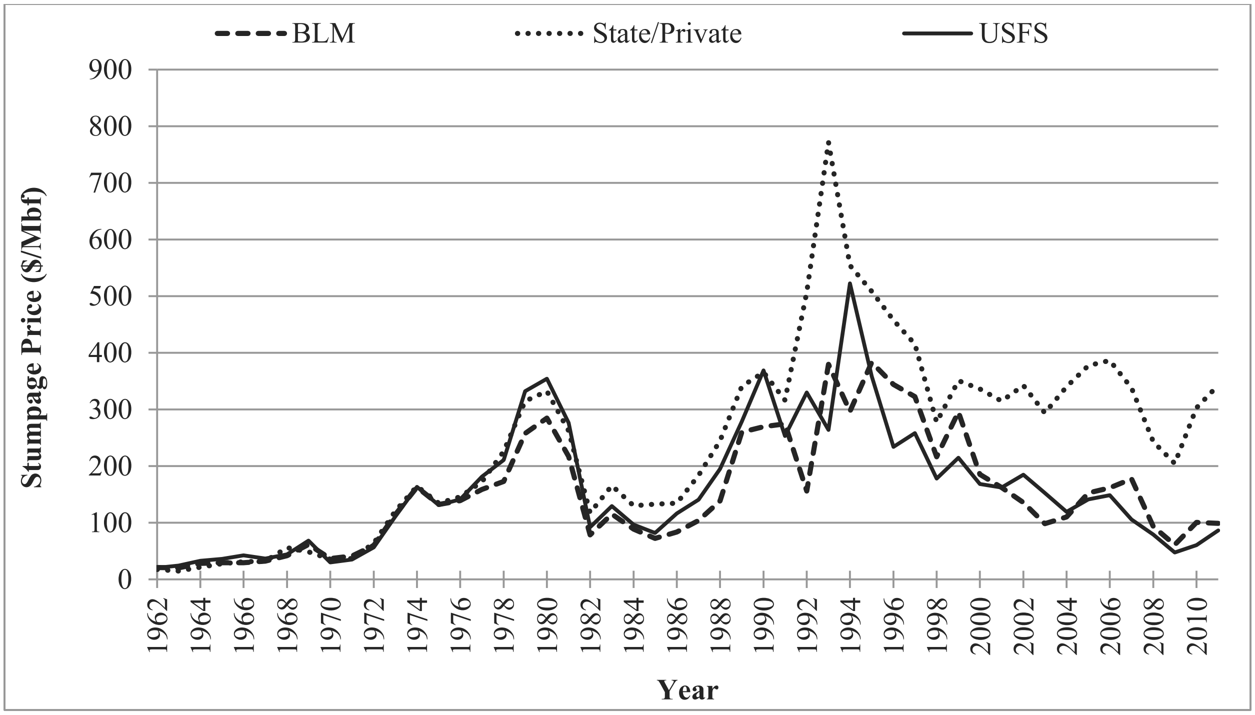


Figure 3-142. Western Oregon historical stumpage prices, BLM and State/private(Source: Zhou and Warren 2012).

Figure 3-141 shows both the declines in total harvest in western Oregon, starting first on private timberlands in the early 1970s and BLM-administered lands in the early 1990s. In the early 1960s, about 20 percent of western Oregon's timber harvest occurred on BLM-administered lands; this had dropped to an average of seven percent between 2008 and 2012. The nearly 85 percent drop in harvest on BLM-administered lands mirrors a similar drop on National Forest lands following the implementation of the 1994 Northwest Forest Plan. **Figure 3-142** shows stumpage prices representing private stumpage markets.[68] The declines in stumpage prices of timber from BLM-administered lands reflect the higher logging costs and lower value log mixes associated with the predominance of thinning harvest, rather than regeneration harvest, under current implementation (see the Forest Management section in this chapter).

Federal lands (including BLM-administered land and National Forests) in western Oregon make up 61 percent of all timberland acreage, but have 73 percent of the growing stock in terms of volume (OFRI 2012). This suggests on average Federal lands have more volume per acre than all timberlands in western Oregon. See the Forest Management section for detail on the BLM's forest inventory conditions.

Demand

Figure 3-141 and **3-142** show how historical timber production and regional price trends tend to fluctuate with overall economic conditions, as, for example, prices and harvest levels declined during the 2007 to 2009 recession repeating patterns of past recessions.

Stumpage prices paid or bid for timber offered for harvest provide an indication of demand for BLM timber in western Oregon. **Figure 3-141**, in spite of its variability, shows an almost flat trend in real

[68] The stumpage price series shown is for western Oregon Department of Forestry sales and, like all federal sales, is limited to domestic markets only.

(inflation-adjusted) stumpage prices in western Oregon over the 50-year period of 1962 to 2011. The overall trend since 1962 is a 0.23 percent increase per year, which this analysis uses as the most appropriate representation of future prices (Haynes *et al*. 2007, Haynes 2008). The regional market includes other private and public timber producers, with private supply particularly dominating (77 percent for the past five years). Since the end of the 2007 to 2009 recession, State, Forest Service, BLM, and private harvests are increasing, as prices recover towards the long-term trend. Prices for public harvests have been rising (**Figure 3-142**).

Demand for BLM timber supply is a function of a variety of factors associated with both the final demand for timber products, as well as competition with other supply sources. Potential timber buyers compare the species composition, timber quality, accessibility, and other harvest cost differences when comparing Federal, State, local, and private timber sources. Federal timber sales have restrictions prohibiting foreign export, which potentially reduces demand, particularly when foreign markets such as Asia are strong.

A wide array of final market goods and services incorporate timber products; consequently, overall timber demand trends strongly with overall economic conditions. New housing starts are a particularly important component of this broad economic demand. In 2008, of the $6 billion in total wood product sales for the state of Oregon as a whole, $2.8 billion came from pulp and paper, $1.5 billion came from sawmills (lumber), followed by plywood, veneers, and other boards (OFRI 2012).

Value

At the BLM district level, harvests have increased in real value since 2012, although price per Mbf has generally declined since 2000 (**Figures 3-143** and **3-144** and **Table 3-146**). Year-to-year value at the district level fluctuates as volume varies, within the overall context of generally increasing harvest volumes and total value for BLM-administered lands in western Oregon as a whole since 2001. For example, the Coos Bay District saw the greatest overall timber harvest volume and value in 2007, while typically, it is in the bottom half of districts by these measures in other years since 2000. Between 2009 and 2014, the Salem District had the greatest timber volume and value, both in total and per Mbf. The Klamath Falls Field Office consistently had the lowest timber harvest volume and value, except for 2007 when Medford was lower. The average value per Mbf for all western Oregon districts over the period 2000 to 2014 was $148. The overall western Oregon BLM harvest value over that period was $322 million.

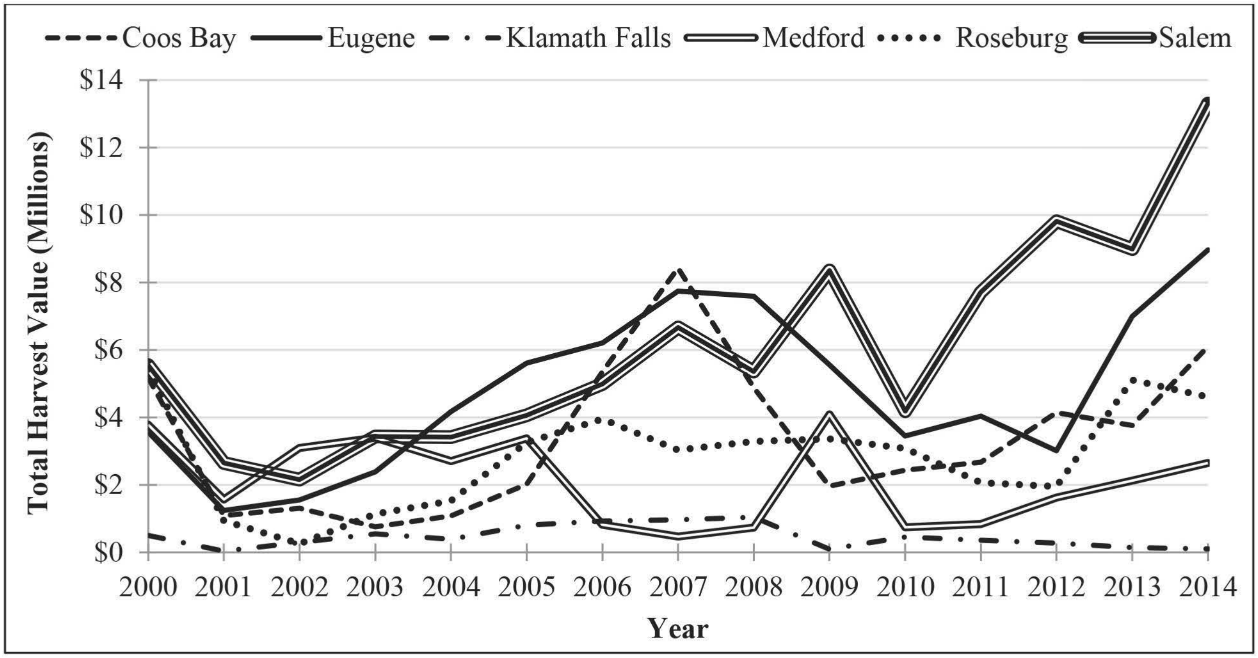


Figure 3-143. Total harvest value by BLM district office, 2000 to 2014.
Source: Timber Sale Information System (TSIS). Notes: All data are in 2012$. Harvest data reflect the value and volume of wood removed from approved contracts during a calendar year, and correspond to sales that were offered and approved within the previous 1-36 months.

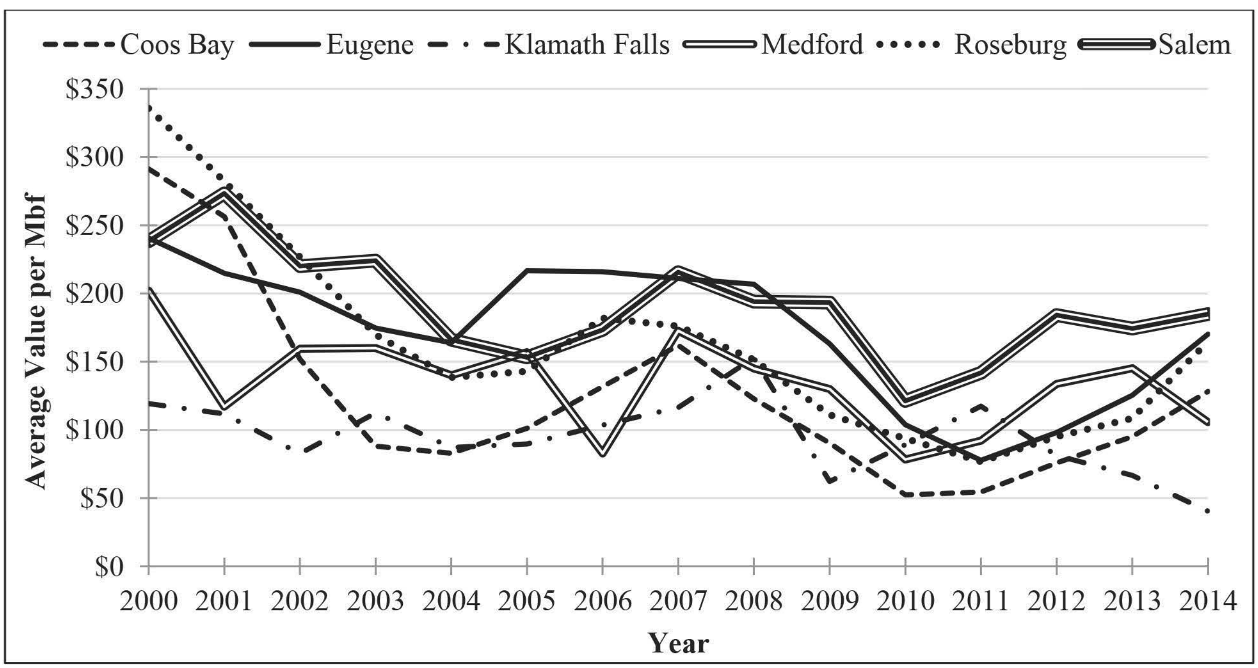


Figure 3-144. Average value per Mbf harvested by BLM District Office, 2000 to 2014.
Source: Timber Sale Information System (TSIS). Notes: All figures are in 2012$. Harvest data reflect the value and volume of wood removed from approved contracts during a calendar year, and correspond to sales that were offered and approved within the previous 1 to 36 months.

Table 3-146. Historical timber sale values and volumes, western Oregon BLM Districts, 2000-2014.

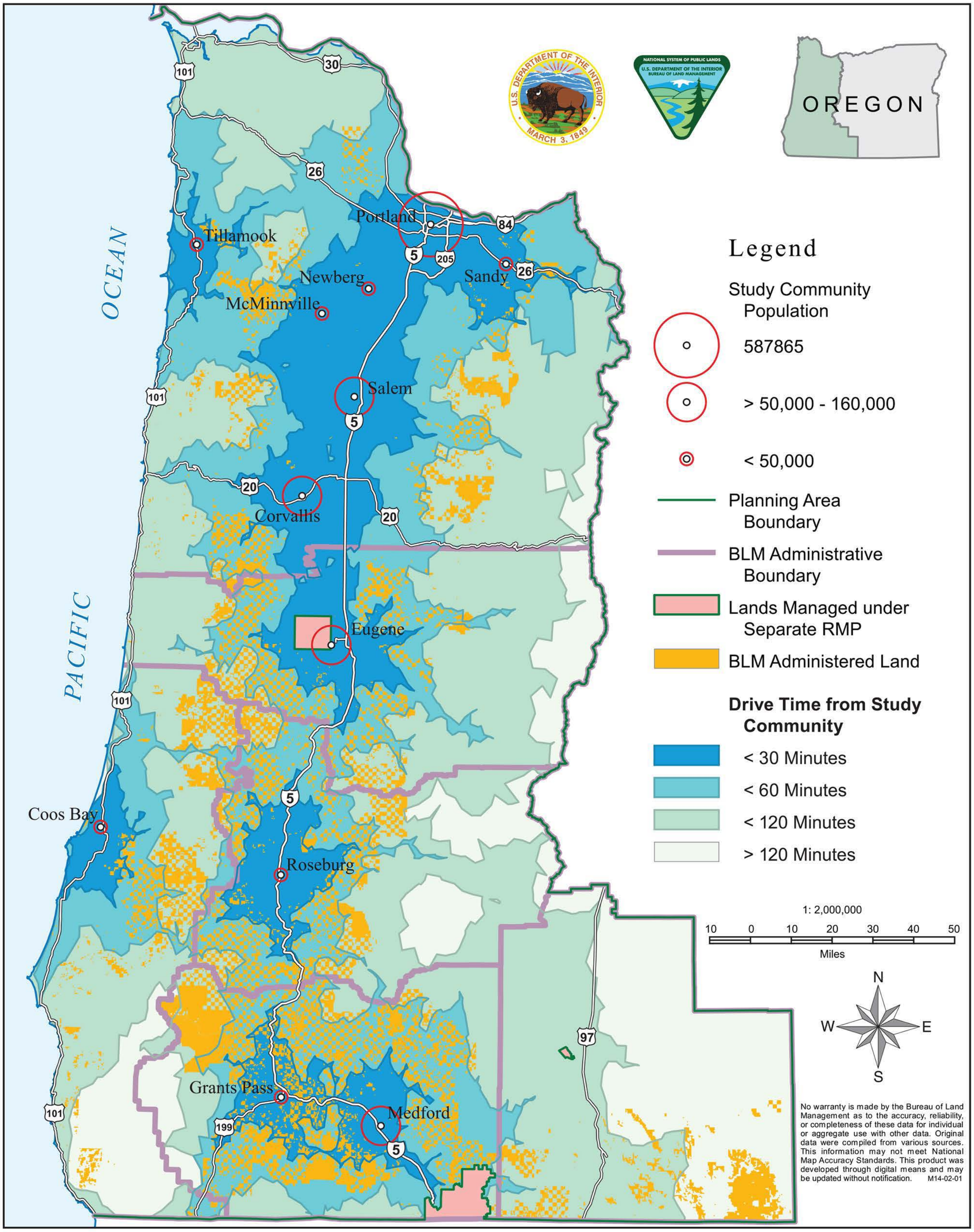
District/ Field Office	Harvest Metric	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Totals
Coos Bay	Harvest Value (Millions)	$6.6	$1.4	$1.6	$0.9	$1.3	$2.3	$6.0	$9.2	$5.2	$2.1	$2.5	$2.7	$4.1	$3.7	$6.0	$55.6
	MMbf Harvested	22.7	5.3	10.6	10.4	15.3	22.9	45.5	56.8	42.1	23.0	48.4	50.0	54.5	39.1	46.7	493.3
	Value/Mbf	$291	$256	$152	$88	$83	$101	$132	$162	$123	$90	$52	$54	$76	$95	$128	$113
Eugene	Harvest Value (Millions)	$4.5	$1.6	$1.9	$2.9	$4.9	$6.4	$6.9	$8.5	$8.0	$5.9	$3.6	$4.1	$3.0	$6.9	$8.8	$78.0
	MMbf Harvested	18.9	7.2	9.5	16.6	30.1	29.7	32.2	40.1	38.9	36.1	34.6	52.9	30.6	55.2	51.7	484.3
	Value/Mbf	$241	$215	$201	$175	$164	$217	$216	$211	$207	$163	$104	$78	$98	$125	$170	$161
Klamath Falls	Harvest Value (Millions)	$0.6	$0.0	$0.4	$0.7	$0.5	$0.9	$1.0	$1.1	$1.1	$0.1	$0.5	$0.4	$0.3	$0.1	$0.1	$7.7
	MMbf Harvested	5.3	0.4	4.4	5.9	5.3	10.2	10.0	9.0	7.2	1.6	5.2	3.1	3.3	2.0	2.5	75.3
	Value/Mbf	$119	$112	$83	$112	$87	$90	$104	$117	$153	$62	$89	$117	$81	$67	$40	$102
Medford	Harvest Value (Millions)	$4.8	$2.0	$3.8	$4.1	$3.2	$3.9	$0.9	$0.5	$0.8	$4.3	$0.8	$0.9	$1.6	$2.1	$2.6	$36.2
	MMbf Harvested	23.9	16.7	23.9	25.7	22.8	24.8	11.0	2.9	5.3	33.3	9.9	9.2	12.1	14.5	24.6	260.5
	Value/Mbf	$202	$117	$160	$160	$140	$157	$83	$173	$145	$130	$78	$92	$134	$145	$106	$139
Roseburg	Harvest Value (Millions)	$6.9	$1.2	$0.3	$1.4	$1.8	$3.7	$4.4	$3.3	$3.5	$3.6	$3.2	$2.1	$1.9	$5.0	$4.5	$46.9
	MMbf Harvested	20.6	4.2	1.4	8.1	13.0	26.2	24.3	18.8	23.0	32.0	34.2	27.3	20.4	46.5	27.4	327.3
	Value/Mbf	$336	$282	$227	$170	$138	$143	$182	$176	$151	$111	$94	$77	$95	$109	$165	$143
Salem	Harvest Value (Millions)	$7.1	$3.3	$2.7	$4.2	$4.0	$4.7	$5.6	$7.3	$5.7	$8.9	$4.4	$7.9	$9.8	$8.9	$13.0	$97.3
	MMbf Harvested	29.7	12.1	12.1	18.5	24.3	30.5	32.2	33.7	29.2	45.8	35.9	55.4	53.3	51.0	70.6	534.5
	Value/Mbf	$238	$273	$220	$224	$166	$153	$173	$216	$194	$193	$121	$142	$184	$174	$185	$182
Totals	**Harvest Value (Millions)**	**$30.6**	**$9.4**	**$10.7**	**$14.1**	**$15.7**	**$22.0**	**$24.9**	**$29.8**	**$24.2**	**$24.8**	**$14.9**	**$18.0**	**$20.8**	**$26.8**	**$35.0**	**$321.7**
	MMbf Harvested	**121.0**	**45.9**	**61.8**	**85.1**	**110.8**	**144.3**	**155.2**	**161.3**	**145.7**	**171.9**	**168.3**	**197.9**	**174.3**	**208.2**	**223.4**	**2,175.1**
	Value/Mbf	**$253**	**$205**	**$172**	**$166**	**$142**	**$152**	**$160**	**$185**	**$166**	**$144**	**$89**	**$91**	**$119**	**$129**	**$157**	**$148**

Source: Timber Sale Information System (TSIS).
Note: All data are in 2012$. Harvest data reflect the value and volume of wood removed from approved contracts during a calendar year, and correspond to sales that were offered and approved within the previous 1-36 months. 2014 data are preliminary and subject to change.

Recreation and Visitation

Supply

The BLM is a major provider of outdoor recreation opportunities throughout western Oregon. The BLM administers approximately 50 percent of all public land within 30-minute driving time of the 12 largest communities in western Oregon, and 34 percent within 60-minute driving time (**Map 3-6**). The Forest Service, National Park Service, Oregon Parks and Recreation Department, Oregon Department of Forestry, and a variety of local agencies and private entities provide a wide variety of outdoor recreation opportunities for residents and visitors. Participation on BLM-administered lands in western Oregon numbered approximately 10.8 million participants in 2013, with wildlife/nature viewing, scenic driving, camping and picnicking, non-motorized trail use, and hunting all experiencing over a million participants (**Table 3-126** in Recreation). The recreation section of the AMS (USDI BLM 2013, pp. 2-72 to 2-82) describes the current conditions and trends for recreation facilities and user numbers in the planning area. The BLM does not currently differentiate areas by recreation management from non-recreation use. **Table 3-147** provides an approximation of current acreage under recreation management, totaling approximately 163,000 acres.



Map 3-6: Travel Times from Major Communities in Relation to BLM Administered Land

Table 3-147. Current recreation acreage of BLM-administered lands by district/field office.

District/Field Office	Current Recreation-Managed Areas (Acres)
Coos Bay	6,629
Eugene	20,511
Klamath Falls	67,933
Medford	32,065
Roseburg	6,984
Salem	28,647
Totals	**162,770**

Source: BLM Recreation Management Area data, estimates prepared for RMP Alternative B.

Demand

The BLM projects overall participation levels to increase; reaching 16.5 million participants annually by 2060 (see the Recreation section in this chapter).

Population centers and surrounding access tend to be the primary factors for demand for outdoor recreation opportunities. Researchers consider site attributes and travel costs, including time, to be the primary factors for variation in demand from one site to another, and for decisions between recreation and other forms of leisure (Loomis and Walsh 1997). Western Oregon is nationally and globally recognized for providing excellent outdoor recreation opportunities, with extensive forests, rivers, and mountains, including access, facilities, and trails throughout. The northern Willamette Valley is the most heavily populated portion of the region, dominated by the Portland metro area (**Figure 3-140** in Recreation). Recreation opportunities within proximity to these population centers experience the most demand, and consequently have the potential to provide the most value, when they provide the types of outdoor recreation of interest. Some of the highest participation levels for trail use on BLM-administered lands are within these proximities.

Extending the analysis of travel distances and BLM-administered lands to other major population centers in western Oregon increases the coverage of BLM-administered lands within 60 minutes of travel. Proximities to population centers tend to correspond to BLM-administered lands with high recreation use (**Map 3-6**). While access is often quite difficult through rugged and mountainous areas, 45 percent of western Oregon is accessible within a 60-minute drive time from one of these population centers, and 56 percent of the BLM-administered lands within this region fall within the 60-minute travel proximity. When considering the overall ownership shares of public lands within these travel proximities, the U.S. Forest Service is the largest landowner, at 48 percent, followed by the BLM at 34 percent (**Table 3-148**).

Table 3-148. Public land ownership shares in 60-minute driving distances from population centers.

Community	Other	Local Government	State of Oregon	BLM	FWS	FS
Coos Bay	3%	-	39%	46%	1%	12%
Corvallis	10%	4%	21%	49%	4%	12%
Eugene	2%	1%	4%	35%	1%	58%
Grants Pass	-	-	2%	80%	-	18%
McMinnville	5%	5%	38%	19%	3%	30%
Medford	-	-	1%	46%	-	53%
Newburg	1%	8%	58%	29%	4%	1%
Portland	-	3%	30%	5%	1%	61%
Roseburg	-	-	1%	47%	0%	52%
Salem	1%	2%	7%	12%	2%	76%
Sandy	1%	3%	2%	6%	2%	85%
Tillamook	3%	4%	53%	12%	-	27%
Totals	**1%**	**2%**	**14%**	**34%**	**1%**	**48%**
Total Acres	**86,571**	**128,766**	**914,736**	**2,315,100**	**72,480**	**3,223,677**

Value

The most commonly used measure of value associated with outdoor recreation activity is consumer surplus, which represents the net benefit to the participant after deducting market-based costs associated with the activity (equipment, transportation, access fees, etc.).[69] Consumer surplus is used to demonstrate the value, expressed in monetary terms, that participants experience but do not have to pay for. Consumer surplus values do not represent dollars exchanged, but, rather, the amount of net benefit beyond expenditures that represent additional willingness-to-pay. Expenditures such as equipment and transportation, while not directly representing value of the recreation site and activity itself, do reflect value to the recreation consumer. Issue 2 describes the effects of recreation expenditures on jobs and earnings.

The Forest Service (Loomis 2005) provides regional estimates by recreation type for the net value (consumer surplus; **Table 3-149**). These estimates derive from a meta-analysis of individual studies to estimate average recreation consumer surplus by recreation type and region. These data represent the average amount participants would pay beyond their total costs for the activity. Therefore, roughly half of participants would receive less consumer surplus, and half would receive more. The ranges for values reflect differing estimates from different contexts. The ranges also demonstrate that differing conditions for recreation opportunities can have very different values to users. Some of the factors that might contribute to variation in value for an activity are the site and facility quality, the attractiveness of the physical characteristics, and the accessibility (travel time). Several factors drive variation in net benefit between individuals, including people's differing preferences for amount and type of outdoor recreation activity. Participants can experience a range of values across participation visits themselves, with

[69] Consumer surplus is the commonly-used measure of value for recreation activity, because while equipment and travel expenses are determined in markets, recreation sites and access are not typically priced according to market forces.

typically some level of diminishing returns with increased number of visits, up to the point where a participant decides not to make one more visit. Again, these data represent an average of all visit values.

Table 3-149. Net economic benefit (consumer surplus) by activity, per user day (2012$).

Activity	Net Economic Benefit		
	Minimum	Mean	Maximum
Camping and Picnicking	$9-$18	$76-$123	$169-$265
Driving for Pleasure (Along Designated BLM Roadways)	$6	$24	$72
Fishing	$5	$52	$122
Hunting (Big Game, Upland Game, and Migratory Game Birds)	$7	$54	$132
Motorized Boating	$15	$32	$76
Motorized Off-Highway Vehicle Travel	$48	$48	$48
Non-motorized Boating	$30	$33	$35
Non-motorized Travel (Hiking, Biking, and Horseback Riding)	$0-$37	$21-$62	$21-$153
Non-motorized Winter Activities	$57	$57	$57
Snowmobile and other Motorized Winter Activities	$13	$43	$147
Specialized Non-motorized Activities and Events	$2	$38	$148
Swimming and Other Water-Based Activities	$7	$32	$70
Wildlife Viewing, Interpretation, and Nature Study	$8	$86	$411

Source: Loomis 2005.
Notes:
- All net economic benefit (consumer surplus) values reported in 2012$. Consumer surplus value does not represent actual financial transaction, but rather value experienced by the participant
- Activity categories from RMIS reports were aggregated to match the BLM reporting categories shown above. These underlying categories were cross-referenced with corresponding categories from Loomis, 2005. Consumer surplus values associated with ‘general recreation’ were applied those activities without representative values.
‘Camping and Picnicking’ used values associated with ‘Camping’ and ‘Picnicking’.
‘Driving for Pleasure (Along Designated BLM Roadways)’ used values associated with ‘Sightseeing’.
‘Fishing’ used values associated with ‘Fishing’.
‘Hunting (Big Game, Upland Game, and Migratory Game Birds)’ used values associated with ‘Hunting’.
‘Motorized Boating’ used values associated with ‘Motorboating’
‘Motorized Off-Highway Vehicle Travel’ used values associated with ‘Off-road vehicle driving’.
‘Non-motorized Boating’ used values associated with ‘Floatboating/rafting/canoeing’.
‘Non-motorized Travel (Hiking, Biking, and Horseback Riding)’ used values associated with ‘Backpacking’, ‘Hiking’, ‘Horseback Riding’, and ‘Mountain biking’.
‘Non-motorized Winter Activities’ used values associated with ‘Cross-country Skiing’.
‘Snowmobile and other Motorized Winter Activities’ used values associated with ‘Snowmobiling’. ‘Specialized Non-motorized Activities and Events’ used values associated with ‘General Recreation’. These values therefore also represent a general recreation value that can be applied with specific type of activity is not identified.
‘Swimming and Other Water-Based Activities’ used values associated with ‘Swimming’.
‘Wildlife Viewing, Interpretation, and Nature Study’ used values associated with ‘Sightseeing’ and ‘Wildlife Viewing’.

The most common outdoor recreation activities, requiring the least equipment or specialized skill, have the greatest participation numbers, and, based on the values in **Table 3-149**, provide the greatest total net benefit; see, for example, Camping and Picnicking, and Wildlife Viewing, Interpretation, and Nature Study. Outdoor recreation participants in 2013 on BLM-administered lands numbered approximately 10.8 million participants. Note that visitor days are fewer than number of participants because visitor days are summed across users to full 12 hours of recreation activity. Therefore, if an individual’s recreation visit participation time is less than 12 hours, the data combine it with time from another participant. Based on the data **Tables 3-149** and **3-150**, and using the average (mean) value, recreation activity contributed approximately $223 million in net economic benefit gains to residents of and visitors to western Oregon.

Table 3-150. Total 2013 visitor days, by activity, to all western Oregon BLM district/field offices, and net benefit estimates (consumer surplus) (2012$).

Activity	Number of Visitor Days	Number of Participants	Total Net Benefit (Consumer Surplus) (Thousands of 2012$)
Camping and Picnicking	938,290	1,273,349	$111,728
Driving for Pleasure (Along Designated BLM Roadways)	376,562	1,959,729	$9,020
Fishing	181,746	598,420	$9,528
Hunting (Big Game, Upland Game, and Migratory Game Birds)	485,911	1,063,709	$26,122
Motorized Boating	41,843	97,622	$1,332
Motorized Off-Highway Vehicle Travel	272,792	826,256	$13,014
Non-motorized Boating	74,580	224,876	$2,454
Non-motorized Travel (Hiking, Biking, and Horseback Riding)	243,325	1,211,201	$9,558
Non-motorized Winter Activities	14,723	50,444	$842
Snowmobile and other Motorized Winter Activities	1,896	6,903	$81
Specialized Non-motorized Activities and Events	111,012	458,870	$4,244
Swimming and Other Water-Based Activities	106,537	424,376	$3,436
Wildlife Viewing, Interpretation, and Nature Study	385,596	2,564,574	$31,512
Totals	**3,234,813**	**10,760,329**	**$222,872**

Sources: Loomis 2005 and 2013 and USDI BLM 2014f.
Notes:
Activity categories provided in the BLM RMIS reports were cross-referenced with corresponding categories from Loomis, 2005. Consumer surplus values associated with 'general recreation' were applied those activities without representative values.
A visitor day represents 12 visitor hours at a site or area. So, for example, 12 one-hour visits equate to one visitor day. As a result there are more participants than visitor days. Participants include both local and non-local people.

Table 3-151 shows the breakdown by BLM district. The Salem and Eugene Districts have the highest visitor day counts and, consequently, the highest recreation values.

Table 3-151. Total 2013 visitor days, by BLM district, and annual net benefit estimates (consumer surplus) (2012$).

District/Field Office	Number of Visitor Days	Total Net Benefit (Consumer Surplus) (Thousands of 2012$)
		Mean
Coos Bay	272,757	$23,858
Eugene	914,175	$59,122
Klamath Falls	48,099	$3,243
Medford	462,463	$28,914
Roseburg	303,727	$20,681
Salem	1,233,592	$87,055
Totals	**3,234,813**	**$222,872**

Source: Loomis 2005 and 2013 and USDI BLM 2014f, applying activity-specific use of consumer surplus values.

Special Forest Products

Supply

Special forest products include all non-timber products harvested or collected from BLM-administered lands in western Oregon. The BLM classifies these products into two broad categories. Category I products, such as Christmas trees, huckleberries, beargrass, pine cones, and some mushrooms (e.g., morels) grow in areas of disturbance. Timber harvesting, commercial thinning, and prescribed burning, create the types of disturbed conditions in which these products grow. Category II products, such as ferns, wild ginger, mosses, and some mushrooms (e.g., chanterelles), grow in undisturbed areas. **Table 3-152** identifies the special forest products found on BLM-administered lands for which the BLM issues permits, and the applicable category.

Under current conditions, approximately 111,300 acres (11 percent) of forest on BLM-administered lands support Category I (disturbance-associated) products and 864,600 acres (89 percent) of forest on BLM-administered lands support Category II (disturbance-averse) products in the coastal/north area. Approximately 195,300 acres (16 percent) of forest on BLM-administered lands support Category 1 products and 992,000 acres (84 percent) of forest on BLM-administered lands support Category II products in the interior/south area. Forest Management describes the distribution of Category I and Category II special forest products in more detail.

Demand

All the BLM district/field offices in the planning area report harvests of non-timber forest products. The BLM manages the collection of these products via a permit system, issuing permits to both commercial collectors and for personal use. District offices report that people seeking permits to harvest are primarily local, and many are immigrants or non-English speakers. However, the BLM does not systematically collect information about the origin or other characteristics of people who receive permits.

Table 3-152 shows the quantity harvested of the special forest products for issued permits, for all products except biomass and wood products, which are addressed in other sections of Issue 1. The data reflect demand for these products, especially floral and greenery and mushrooms, but they likely underestimate the demand for several reasons:

- In some cases, there is a limit or cap on the number of permits issued or on the quantity of goods harvested. For such goods, demand would be greater than indicated by quantity harvested.
- Permittees may inaccurately report quantity harvested, resulting in these numbers either under or overestimating demand, though the tendency is likely toward underestimation.

Some harvest may take place without a permit (illegal trespass), so that demand is not captured in BLM data. BLM law enforcement reports that trespass is a problem (Babcock 2014, personal communication). In 2012, the Roseburg District issued the most permits at 1,440, followed by the Eugene (1,152), Coos Bay (980), Medford (241), Salem (122) Districts, and the Klamath Field Office (94).

Table 3-152. Special Forest Products: permits, minimum prices, market values, and revenue to BLM (CY 2012 for all districts).

Special Forest Product	Category	Unit of Measure	Quantity Harvested	Number of Permits	BLM Minimum Price per Unit	Market Price (Low)	Market Price (High)	BLM Revenue	Market Value (Low)	Market Value (High)
Boughs	2	Pounds	182,075	70	$0.03	$0.19	$0.71	$5,700	$34,600	$129,300
Burls & Misc.	2	Pounds	3,600	7	$0.05	$1.94	$2.91	$200	$7,000	$10,500
Christmas Trees	1	Count	581	818	$3.00	$16.94	$16.94	$4,500	$9,800	$9,800
Edibles & Medicinals	1, 2	Pounds	17,400	31	$0.05	$2.46	$3.24	$900	$42,800	$56,400
Floral & Greenery	1,2	Pounds	1,192,125	1,467	$0.05	$2.52	$4.40	$82,200	$3,004,200	$5,245,400
Mosses	2	Pounds	1,000	1	$0.10	$2.51	$3.77	$100	$2,500	$3,800
Mushrooms	1 (Morels) 2 (Chanterelles)	Pounds	315,138	1,621	$0.10	$2.70	$125.40	$48,500	$850,900	$39,518,300
Seeds & Seed Cones	1 (Pine) 2 (Hemlock)	Bushels	1,000	3	$0.20-$0.25	$0.42	$3.05	$100	$400	$3,100
Transplants & Ornamentals	1, 2	Count	650	11	$1.00-$10.00	$0.02	$18.24	$400	< $100	$11,900
Totals		-	-	**4,029**	-	-	-	**$238,200**	**$3,952,200**	**$44,988,300**

Sources: Barnard 2014, Blatner and Alexander 1998, USDI BLM 2014, Draffan 2006, Muir *et al.* 2006, Pacific Northwest Christmas Tree Association 2014, USDI BLM Salem 2011, Schlosser and Blatner 1997, Schlosser 1995, Thomas and Schumann 1993.

Note: All values rounded to the nearest hundred.

Value

Table 3-152 also shows the BLM's minimum price list for permitted special forest products, and a range of market values found in the literature (see table sources). Some districts price special forest products higher on a per-unit basis than the BLM's minimum price, though most districts reported using the minimum prices for most products.

Researchers with the U.S. Forest Service conducted the most thorough research on the market for special forest products in the Pacific Northwest in the 1980s and 1990s. These studies estimated that annual permitted harvest values across these markets totaled to $400 million for the Pacific Northwest annually (Schlosser and Blatner 1992). Later researchers noted "there is very little information about year-to-year prices for products within the different industries [for various special forest products], so although large general trends can be discussed, specific prices and industry trends are not well understood" (Blatner and Alexander 1998). This research also suggests high levels of unpermitted use, and corresponding greater actual value harvested. Schlosser and Blatner (1997) estimated Christmas greens contributing approximately $128.5 million in product sales in the region in 1989, while edible mushrooms contributed $41.1 million in product sales.

Table 3-152 shows the revenue the BLM received from permit sales for the special forest products in 2012, and the value of each type of special forest product based on the range of market values. BLM revenue was highest in the Eugene district ($78,500), followed by the Roseburg ($60,300), Coos Bay ($44,300), Medford ($29,200), Salem ($22,300) Districts, and the Klamath Falls Field Office ($3,500).

As **Table 3-152** shows, special forest products in each grouping may contain species that thrive in either Category I or Category II land. For example, some mushrooms, such as morels, grow best in disturbed areas, while others, such as chanterelles, require undisturbed land to flourish. The BLM collects some data on the type of mushroom harvested, but for about 80 percent of the permit records related to mushrooms, the species is unspecified. This data insufficiency makes it difficult to determine the distribution of value between Category I and Category II lands for groupings that are in both categories.

Sustainable Energy Production

Supply

The potential sustainable sources of energy from BLM-administered lands include biomass, geothermal, solar, and wind. The Sustainable Energy section of the AMS (USDI BLM 2013, pp. 2-117 to 2-120) discusses in more detail the background and potential for development of each on BLM-administered lands in western Oregon. As of 2014, there are no geothermal, solar, or wind developments on BLM-administered lands in the planning area, though, the U.S. Department of the Interior has identified one site with the potential for generating energy from geothermal resources.

The BLM-administered lands in western Oregon generate several types of biomass, including slash, lumber and paper byproducts (e.g., pulp), firewood, and scrap and salvaged wood. The source of biomass the BLM is most likely to offer for energy production is slash from logging (see the Sustainable Energy section in this chapter). Thus, the quantity of biomass available for energy production each year derives from the volume of timber harvests. According to the Sustainable Energy section, about 92,000 green tons of biomass from slash are available each year. Supplies of other sources of biomass, such as firewood, are available to produce additional energy.

Demand

Although BLM-administered lands in western Oregon provide some areas suitable for wind production, there is currently no demand for developing these areas, because their proximity to transmission capacity and centers of demand make development too costly under today's economic conditions (Peter Broussard, BLM, personal communication, 2013). Currently, demand for generating energy via geothermal resources is limited by technology and a lack of infrastructure to convey energy to population centers. There is no current demand for solar energy in the decision area based on current solar generation technology.

Markets for biomass fuel are close in proximity to the production areas, but other Federal, State, and private sources supply these markets. State and Federal mandates that require energy companies and communities to invest in renewable energy resources are driving investors to consider the energy resources available on BLM-administered lands, including those in western Oregon (USDI BLM 2014c). The BLM is actively working with communities and companies in western Oregon to develop information, infrastructure, and other resources to better-utilize biomass for renewable energy production (USDI BLM 2006 and 2010). Several co-generation facilities exist in western Oregon that utilize biomass to produce electricity, most commonly associated with existing sawmills. Timber companies and other partners are exploring opportunities for installing new generation capacity at existing sawmills, and building small-scale generation and heating projects for institutional facilities, such as schools (USDI BLM 2006).

Utilization of biomass (using sold amounts as a proxy for utilization, and utilization to represent demand) from BLM-administered lands has varied over the last few years, ranging from almost 70,000 green tons in 2010 to less than 10,000 green tons since 2011. Incentives provided through the American Recovery and Reinvestment Act of 2009 likely contributed to the peak in 2010. In 2012, among the district/field offices in the planning area, only the Klamath Falls Field Office reported production of biomass materials totaling 3,000 bone dry tons. All six districts reported issuing permits for fuel wood, amounting to 5,578 green tons produced. Assuming 40 percent moisture content, this equals 3,347 bone dry tons. Thus, the total quantity of biomass utilized in 2012 was 6,347 bone dry tons. Based on a range of 7,600 to 9,600 BTUs per pound, this quantity of biomass would produce about 96,000 to 122,000 million BTUs of energy.

Value

In 2012, the BLM received $1,500 in revenue from selling a permit for 3,000 bone dry tons of biomass. This equates to $0.50 per bone dry ton or about $0.03 per million BTUs. This transaction occurred in the jurisdiction of the Klamath Falls Field Office. The BLM also granted permits for the procurement of about 5,600 green tons of fuel wood across all six districts, and received in exchange about $30,700 in revenue. Assuming that the average moisture content of the biomass is 40 percent, this equates to about $9 per bone dry ton or about $0.5 to $0.6 per million BTUs. Data are unavailable to quantity the amount or value of biomass from BLM-administered lands that timber companies and paper mills utilized to produce energy.

Grazing

Supply

Three of the BLM administrative units in the planning area report active grazing: the Coos Bay District, the Medford District, and the Klamath Falls Field Office. The Grazing section in this chapter provides detail on the current and historic supply of grazing resources. In 2012, the decision area had approximately 23,000 active AUMs (animal unit months; **Table 3-153**).

Table 3-153. Grazing, number of permittees, forage, market value, and BLM revenue, 2012.

District/ Field Office	Number of Permittees	Number of Allotments Leased	Active AUMs[1,2]	Billed AUMs[1,2]	Market Value Based on Private Forage Price ($16.80/AUM)	Market Value Based on State Forage Price ($8.48/AUM)	BLM Revenue Based on Federal Grazing Fee ($1.35/AUM)
Coos Bay	4	4	23	23	$386	$195	$31
Eugene	-	-	-	-	-	-	-
Klamath Falls	63	83	12,762	9,432	$158,458	$79,983	$12,733
Medford	43	50	10,255	6,878	$115,550	$58,325	$9,285
Roseburg	-	-	-	-	-	-	-
Salem	-	-	-	-	-	-	-
Totals	**110**	**137**	**23,040**	**16,333**	**$274,411**	**$138,512**	**$22,051**

Sources: Grazing section of Chapter 3, USDI BLM 2014b, USDI BLM 2014e.
Notes:
[1]An animal unit month is the amount of forage required to sustain one cow and her calf, one horse, or five sheep or goats for a month on lands in western Oregon. Active AUMs is a measure of the amount of forage available on land designated for grazing in a given year.
[2] An active AUM is a measure of the amount of forage available in a given year. A billed AUM is the amount of forage actually used.

Demand

Demand for grazing permits on BLM-administered lands is from private land owners in the vicinity of and adjacent to BLM-administered rangelands, whose property the BLM has recognized as having preference for the use of public grazing privileges. Public rangelands are made available for grazing through a system of permits and leases tied to particular areas (allotments) and quantities of forage. In 2012, there were 110 permittees leasing 137 allotments (**Table 3-153**).

Value

The Federal government sets the Federal grazing fee annually, which applies to BLM- and Forest Service-administered lands in the 16 western states. The fee is adjusted based on a formula set by Congress in the Public Rangelands Improvement Act of 1978 and modified by subsequent presidential executive orders. While the fee takes into account market factors, such as production costs and beef prices, the price is not set in an open market, so may not reflect the actual value of the right to graze animals on BLM-administered land.

The Federal grazing fee in 2012 was $1.35 (USDI BLM 2013, USDI BLM 2014d). By law, the fee cannot fall below $1.35 per AUM, and cannot increase or decrease more than 25 percent year-over-year (Vincent 2012). Since 2004, the fee has ranged from $1.35 to $1.79. The BLM collected approximately $22,000 in revenue for the AUMs within the decision area in 2012 (**Table 3-153**).

Disputes persist about the extent to which Federal grazing fees actually reflect “fair market value.” (USDI BLM 2013). The average price of private forage on land in the western United States in 2011 was $16.80 per AUM (USDI BLM 2013). The grazing fee on State trust lands in Oregon in 2012 was $8.48 per AUM (Oregon Department of State Lands 2012). The price of an AUM on BLM-administered land may not compare directly to grazing fees for private land, because private grazing fees may include other services, such as fencing and water infrastructure that BLM allotments do not provide. State grazing fees may provide a better comparison, although differences in proximity, density of forage, and herd security between state trust and BLM-administered lands may still factor into a lower average value associated with using BLM-administered lands for grazing. The actual value of an AUM on any given BLM-administered allotment may have a different value to the livestock producer, depending on characteristics other than quantity of forage.

Rangeland provides a broad range of goods and services. See the recreation and biodiversity subsections of this issue for discussion of the value of other goods and services associated with rangeland.

Minerals

Supply

BLM-administered lands include approximately 2.5 million acres that provide mineral resources to the public. These lands include saleable, locatable, and leasable mineral resources.

- **Saleable Minerals.** The primary saleable mineral resources associated with BLM-administered lands in western Oregon are sand, gravel, and crushed stone, referred to collectively as “mineral material.”
- **Locatable Minerals.** Locatable minerals in western Oregon include precious metals (e.g., gold, silver, nickel, mercury, and uranium), nonmetallic minerals (fluorspar and gemstones) and uncommon variety minerals (certain limestone and silica).
- **Leasable Minerals.** Leasable minerals in western Oregon include oil, gas, coalbed natural gas, or coal.

Those interested in mineral development have access to a large majority of BLM-administered lands in the planning area. Currently, approximately 13 percent, or 319,000 acres, of BLM-administered lands are closed to salable-mineral exploration, and approximately 4 percent, or 98,400 acres, are closed to locatable-mineral exploration. None of the BLM-administered lands are closed to leasable-mineral exploration. Minerals provides more detail on the supply of mineral resources.

Demand

Demand for minerals on BLM-administered lands comes from several sources: commercial (e.g., timber companies), governmental agencies utilizing materials for government projects with free use permits, and individuals looking for mineral resources (mostly locatable minerals) primarily for personal use or enjoyment. All these types of demand have the potential to generate economic benefits. This section focuses on demand from larger-scale mineral production. There are no current leases for oil, gas, or coal on BLM-administered lands in western Oregon, and limited activity related to locatable minerals. The BLM does not collect information about the quantity of locatable minerals removed from mining claims.

There are over 1,000 developed quarries for saleable minerals on BLM-administered lands in western Oregon. In 2012, producers removed approximately 35,555 cubic yards of mineral material from these quarries, primarily crushed and specialty stone. Approximately 85 percent was from the Roseburg District (**Table 3-154**). Between 2005 and 2012, producers removed on average about 25,000 cubic yards in the Medford, Roseburg, and Eugene Districts. The most common uses for these minerals are road construction and resurfacing, and building other surfaces for use during logging operations. Recreation (e.g., boat ramps) and conservation (e.g., stream improvements) activities use some material. The relatively close proximity of the source of saleable minerals to road, logging, and recreational construction projects on BLM-administered lands helps reduce the costs of these projects.

Table 3-154. Saleable minerals, market value, and revenue, 2012.

District/Field Office	Mineral Material Removed from BLM-administered Lands (Cubic Yards)	Market Value and Revenue to BLM
Coos Bay	-	-
Eugene	27	$188
Klamath Falls	-	-
Medford	5,285	$3,584
Roseburg	30,243	$15,141
Salem	-	-
Totals	**35,555**	**$15,328**

There were 1,045 active mining claims for locatable minerals on BLM-administered lands in western Oregon in 2013, an increase of 25 percent since 2005 (USDI BLM 2013). Most of the increase is in the Medford District, where claims increased by 200, or about 30 percent.

Value

Federal law authorizes the BLM to sell saleable mineral materials at fair market value. Prices for mineral material are set by district rate sheets, or by appraisal for larger or specialized quantities. The price per cubic yard in 2012 ranged from $0.50 to $10.00 per cubic yard. The Eugene and Roseburg Districts charged $0.50 per cubic yard for most sales while the Medford District charged $3.00 per cubic yard for most sales. The market value to the BLM in 2012 was approximately $15,300 (**Table 3-154**).The value of locatable minerals would also be based on their market value. However, the BLM does not collect information on production from these claims.

The value of recreational mining, where people participate for the experience as much or more than the prospect of earning income, is partially captured in the Recreation section of Issue 1. The BLM does not explicitly track user days for recreational mining, but some of these users are likely captured in the data for other recreational activities (e.g., hiking or motorized travel).

Carbon Storage

Supply

The Climate Change section in this chapter describes the current conditions regarding climate change and carbon storage for the decision area. Forests in the decision area are a sink for carbon, fixing more carbon above- and below ground than they emit. The BLM-administered lands in the planning area store an estimated 373 teragrams of Carbon (Tg C) (1 Teragram is equivalent to 1 million metric tons. The carbon density, the amount of carbon per acre, varies by office with Klamath Falls having the lowest density and Eugene the highest. Each year the net amount of carbon stored in forests changes, with some being released through fire, decay, and other processes, and some being fixed through growth. In 2012, the forests in the decision area fixed and stored a net total of about 673,000 metric tons of carbon.

Demand

Across the world, many individuals, businesses, and governments recognize a need to address climate change through greenhouse gas mitigation and adaptation, to avoid costs associated with climate change now and in the future. Some markets exist where greenhouse gas producers pay dollars for so-called “carbon offsets” or “carbon credits.” However, there is no active trading market in western Oregon, and the BLM does not participate in these markets. Among individuals and groups, demand exists to maintain existing carbon sinks and increase opportunities for carbon storage in western Oregon, but a funding mechanism to achieve this does not exist.

Value

Absent a market for carbon, this section addresses the value of carbon storage from a social perspective, where the value of carbon storage is derived from nonmarket valuation techniques such as avoided cost and avoided risk. The social cost of carbon (SCC) is an estimate of the anticipated future damages from greenhouse gas emissions. According to an Interagency Working Group convened by the Council of Economic Advisers and the Office of Management and Budget to analyze the social cost of carbon, SCC "is intended to include (but is not limited to) changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change." (Interagency Working Group on Social Cost of Carbon, United States Government 2013) The Interagency Working Group revised its estimates of the SCC in 2013.

Combining the BLM estimates of the amount of carbon stored in forests in the decision area with the most recent average SCC estimates at the three percent discount rate, yields a value of carbon stored annually by forests in the decision area of approximately $99 million (**Table 3-155**). Using estimates that reflect higher risk of damage (the 95th percentile), yields a value of about $291 million.

Table 3-155. Quantity of total carbon stored on BLM-administered lands, estimated annual carbon stored, and estimated value (2012$).

District/Field Office	Stock of Stored Carbon (Million Metric Tons)	Estimated Annual Carbon Storage (Million Metric Tons)	Value of Estimated Annual Stored Carbon (Millions)	
			Average[1]	95th Percentile[1]
Coos Bay	61.21	0.17	$24	$73
Eugene	61.12	0.16	$24	$70
Klamath Falls	8.92	0.01	$1	$3
Medford	98.13	0.03	$4	$11
Roseburg	65.95	0.08	$11	$33
Salem	77.69	0.23	$34	$101
Totals	**373.02**	**0.67**	**$99**	**$291**

Source: USDI BLM and Interagency Working Group on Social Cost of Carbon 2013.

[1] Values are based on SCC estimates converted from per metric ton of Carbon Dioxide (CO_2) to per metric ton of Carbon (C) and converted to 2012$, as described in the methodology at the beginning of this section. Both the average and 95th percentile scenarios reflect a 3 percent discount rate.

Source Water Protection

Supply

The BLM-administered lands in western Oregon capture, filter, and convey water that people in communities across western Oregon drink. There are approximately 20,400 miles of streams and rivers and 218,000 acres of lakes, ponds, and wetlands on BLM-administered lands (USDI BLM 2013). In 2011, the BLM and the Oregon Department of Environmental Quality signed a memorandum of understanding (MOU) that documents the efforts that both agencies will take for "managing and controlling point and nonpoint source (NPS) water pollution from BLM-managed lands in the State of Oregon." (Oregon DEQ and USDI BLM 2014, p. 1). Specific to the BLM's Resource Management Plans, the MOU states that RMPs will identify and include best management practices (BMPs) to control non-point sources of pollution (NPS), to the "maximum extent practicable" (Oregon DEQ, no date, p. 1; Oregon DEQ 2014). The Hydrology section in this chapter discusses the quantity and quality of water produced from the decision area.

Demand

Approximately 80 percent of Oregonians depend on drinking water from public water systems. These public water systems draw surface water and groundwater from areas designated to protect the quality of drinking water. There are approximately 80 source water watersheds in the planning area with varying amounts of BLM-administered lands. According to the *Atlas of Conservation Values*, 73 percent of the BLM-administered lands in western Oregon are in areas the Oregon DEQ identifies as drinking water protection areas (TNC and WSC 2012). The Oregon DEQ and the Oregon Health Authority have identified the source water areas in the State and conducted inventories of sources of contamination (USDI BLM 2013, p. 2-44). Source water areas for many public water systems encompass lands with multiple ownerships and varying forest management policies where BLM-managed land is often a minority portion of the total watershed. Many BLM-administered lands in these watersheds occupy headwaters locations miles upstream from surface water sources (D. Carpenter, personal communication, 2014).

Value

The economics literature on water-treatment costs includes a growing number of studies that find a relationship between the quality of forest cover in source-water areas, and treatment costs for utilities that source from these areas. These studies conclude that greater and higher quality forest cover helps reduce treatment costs (Freeman *et al.* 2008, USDA FS 2000, Earth Economics 2012, World Resources Institute no date). Utilities manage water systems to address sources of risk to drinking water supplies. To the extent that forest management practices influence the risk of threats to a watershed's integrity and its ability to provide clean drinking water, those changes would generate benefits or create costs for utilities (Freeman *et al.* 2008, USDA FS 2000, Earth Economics 2012, World Resources Institute no date).

Biodiversity and Sensitive Species

Supply

The BLM-administered lands in western Oregon include habitats and species of biodiversity importance. Important habitats include old-growth forests, wetland and riparian areas, and habitats contained in Areas of Critical Environmental Concern (ACEC), and Outstanding Natural Areas (ONA). Important species include rare plants and fungi, various species of land animals, fish, and insects (e.g., northern spotted owl, marbled murrelet, coho calmon). Thirteen Federally-listed and one candidate plant species exist in the planning area. The BLM documented nine of these species on BLM-administered lands (USDI BLM 2013, p. 2-66). The *Atlas of Conservation Values* includes maps of species of concern and critical habitats for listed species on BLM-administered lands (The Nature Conservancy and Wild Salmon Center 2012). Wildlife, Rare Plants and Fungi, and Areas of Critical Environmental Concern contain information on the supply or prevalence of specific species. Many of these species are found in Areas of Critical Environmental Concern (ACEC), including Research Natural Areas that contain areas for ecological and environmental studies and preserves of gene pools of typical and endangered plants and animals.

Demand

Markets do not exist for the biodiversity aspects of habitats and species. However, evidence of demand exists elsewhere. Biologically diverse habitats provide biophysical functions that people depend on for survival. Individuals and households express their demand for habitats and species through survey responses. Society as a whole expresses demand through laws protecting threatened or endangered species and the habitats they depend on.

The Millennium Ecosystem Assessment (MEA) describes the importance of biodiversity to the biophysical functions that people depend on:

> "Biodiversity—the diversity of genes, populations, species, communities, and ecosystems—underlies all ecosystem processes. Ecological processes interacting with the atmosphere, geosphere, and hydrosphere determine the environment on which organisms, including people, depend. Direct benefits such as food crops, clean water, clean air, and aesthetic pleasures all depend on biodiversity, as does the persistence, stability, and productivity of natural systems." (MEA 2005, p. 79)

The biodiversity within forest- and water-related ecosystems supports a range of fundamental ecosystem services that people depend on including:

- Waste disposal
- Soil formation
- Nitrogen fixation
- Bioremediation of chemicals
- Crop and livestock breeding
- Biological control of pests
- Pollination

  (Pimentel *et al.* 1997, Krieger 2001)

People and households express their demand for habitats and species through their response to survey questions. The economics literature contains numerous reports and articles in academic journals that describe studies of individual and household willingness to pay to protect habitats and species. Examples include, Pascual and Muradian (2010), Loomis and White (1996), Hagen *et al.* (1992), Loomis and Gonzalez-Caban (1998), Bulte and Van Kooten (1999), Rubin *et al.* (1991), Moskowitz and Talberth (1998), Spies and Duncan (2008), Loomis *et al*. (2014). The Value subsection below includes values from a number of these studies.

Society expresses demand for biodiversity and related habitats and species when voters or their elected representatives pass laws protecting threatened or endangered species and the habitats they depend one. For example, when the U.S. Congress passed the Endangered Species Act in 1973, it recognized, "… that our rich natural heritage is of 'esthetic, ecological, educational, recreational, and scientific value to our Nation and its people." (USDI FWS 2013) According to the U.S. Fish and Wildlife Service, the purpose of the act is to, "protect and recover imperiled species and the ecosystems upon which they depend." (USDI FWS 2013) The State of Oregon has laws similar to the ESA and maintains its own list of threatened and endangered species separate from the species on the Federal ESA lists (Oregon Department of Fish and Wildlife no date).

Value

The BLM identifies important values that areas provide including historic, cultural, or scenic; fish and wildlife resources; and natural processes or systems (USDI BLM 2013c, p. 2-14). Because people rely on these ecosystem services from forestlands, they also have economic value (Pimentel *et al.* 1997, Balmford *et al.* 2002, Farber *et al.* 2002, and, Pascual and Muradian 2010). The economic literature on this topic includes a number of studies that estimate the value of biodiversity and sensitive species in different contexts. Loomis *et al.* (2014) summarized the average values that sample households in the United States place on protecting threatened and endangered species, by species group, see **Table 3-156**. In general, the average value takes into account the range of household values from zero to the highest values. Researchers typically apply the average value to all households in a study area.

Table 3-156. Willingness to pay (WTP) values per household, by species.

Species Group	Average Annual WTP (2006 Dollars)
Birds	$42
Fish	$105
Mammals	$17
Marine Mammals	$40

Source: Loomis *et al*. 2014.

The literature also includes studies of sample households' average willingness-to-pay for some, but not all, of the threatened and endangered species present in the planning area (**Table 3-157**), and to protect old-growth habitat (**Table 3-158**).

Table 3-157. Annual willingness to pay (WTP) values per household, by species.

Species	Average Annual WTP (2006 Dollars)
Bald eagle (*Haliaeetus leucocephalis*)	$118[1]
Fender's blue butterfly (*Icaricia icarioides fenderi*)	Unknown[5]
Fisher (*Pekania pennanti*)	$17[2]
Golden eagle (*Aquila chrysaetos canadensis*)	$42[2]
Marbled murrelet (*Brachyramphus marmoratus*)	$42[2]
Northern spotted owl (*Strix occidentalis caurina*)	$61[1]
Oregon silverspot butterfly (*Speyeria zerene hippolyta*)	Unknown[5]
Red tree vole (*Arborimus longicaudus*)	$16[3]
Greater sage-grouse (*Centrocercus urophasianus*)	$42[2]
Steller's sea lion (*Eumetopics jubatus*)	$76[1]
Streaked horned lark (*Eremophila alpestris strigata*)	$42[2]
Taylor's checkerspot butterfly (*Euphydras editha taylori*)	Unknown[5]
Gray wolf (*Canis lupus nubilus*)	$20[1]
Wolverine (*Gulo gulo*)	$181[4]

Sources:
1: See Martín-López *et al.* 2008, and references therein.
2: No species-specific studies exist; representative values from Loomis *et al*. 2014 used.
3: White *et al*. 1997. Note that the value reported above was not calculated for the red tree vole, specifically, but for a different vole species.
4: Ericsson *et al*. 2007.
5: No studies exist to estimate the WTP for invertebrate species, such as butterflies. However, Diffendorfer *et al*. (2013) calculated that U.S. households value monarch butterflies (*Danaus plexippus*) at approximately $4.78–$6.64 billion—a level similar to many endangered vertebrate species.

Table 3-158. Annual willingness to pay (WTP) values per household to protect old-growth habitat.

Source	Average Annual WTP (2012$)
Rubin *et al.* (1991)	$65
Moskowitz and Talberth (1998)	$64 - $192
Loomis *et al.* (1994)	$128

The studies that produced the dollar amounts in **Table 3-157** and in **Table 3-158** differ in their location and year conducted, demographic characteristics of study populations, approach, methods, questions asked, and in some cases include values for multiple and overlapping goods or services. Extrapolating these results to an accurate total value for the planning area is not possible given these variables. Nevertheless, the findings confirm, that, on average, households in the United States value threatened and endangered species. For illustrative purposes, the BLM estimated the value of bird species in the planning area using the latest estimates of willingness-to-pay from Loomis *et al.* (2014). A number of important bird species and their habitats exist in the planning area including eagles, marbled murrelet, and northern spotted owl. Multiplying the average household willingness-to-pay estimate for bird species from Loomis *et al.* (2014), $47 (2012$) by the number of households in the planning area, approximately 1.3 million (U.S. Bureau of the Census 2014b), yields an estimated value of approximately $63 million (2012$).

Scenic Amenities

Supply

The BLM categorizes the BLM-administered land into one of four classes based on the relative quality of visual resources. Visual Resource Inventory Class I indicates those areas with the highest scenic quality. The other three classes indicate varying levels of scenic quality, sensitivity, and distance to features. Over half of the land in the decision area is Class IV, which is the category of lowest visual resource quality. About a quarter of the land (about 553,000 acres) is Class II and another quarter is Class III (about 578,000 acres. Less than 1 percent of land in the decision area is Class I. Visual Resource Management contains more detail.

Demand

People care about scenic amenities for a variety of reasons. Much of the demand for scenic amenities comes when people engage in recreation. It is difficult to separate the demand for visual experience from the rest of the recreation experience, and the demand for recreation activities, such as motorized and non-motorized travel largely captures the demand for scenic amenities in the decision area. Scenic amenities are important to non-recreationists, including those who live or work nearby BLM-administered lands and have views of public property.

Value

This section focuses on the value to private property owners with views of BLM-administered lands. The recreation section includes the scenic amenity value from recreation-based activities. Economic modeling demonstrates what common observation suggests: private property with a good view sells at a premium, compared to property without (Garrod *et al*. 1997, Malprezzi 2002). The value of the premium is highly variable, and depends on the larger geographical and social context of the property. Studies have found premiums for views associated with residential properties ranging from insignificant but positive to 1 percent to 89 percent of the price of a home (Behrer 2010). Most studies find the premium of a view is comparable to the premium added by a fireplace or a pool. The economic literature suggests that the price premium is more relevant for higher-valued residential properties and property with a primary purpose of recreation.

Cultural Meaning

Supply

The BLM-administered lands in the planning area contain over 2,400 recorded cultural resource sites, including sites that are pre-historic, historic or, multi-component (i.e., possessing both historic and prehistoric components). Cultural Resources and Paleontological Resources provides additional detail on cultural resources. The BLM-administered lands also provide intangible cultural services. The Millennium Ecosystem Assessment defines cultural services as including “nonmaterial benefits people obtain through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences” (Sarukán and White 2005).

Demand

Visitation to specific sites, organized activities on and related to BLM administered lands, and individual interaction with specific resources demonstrate demand for the cultural resources. Demand also exists among populations who may not visit BLM-administered lands or interact with resources directly, but hold their existence to be important to maintain their cultural identity, for example.

BLM district/field offices reports document many examples of demand for cultural resources. Three of many examples are:

- The Coos Bay District promotes and facilitates access to the Cape Blanco Lighthouse, which is the oldest lighthouse in Oregon. In 2012, 20,000 visitors toured the lighthouse.
- In the Roseburg District, BLM staff collaborated with the Umpqua National Forest to conduct a Passport in Time public archaeology project. Other examples of demand include school-age children attending the School Forestry Tour and Creek Week.
- Between 1996 and 2012, the Salem District conducted 392 public education and interpretative programs focusing on cultural resources, which involved 17,833 people.

Nine Federally-recognized Tribes have lands or interests within the planning area. Tribal members express their demand and value for cultural resources in the ways they use and protect resources that have cultural importance to them. In some cases, uses are consumptive, as when Tribal members collect and consume wild plants as food or medicine. In other cases, uses are non-consumptive, as when accessing a location for ceremonial or sacred purposes. Tribes are also engaged in active management and protection of resources on BLM-administered lands (USDI BLM 2013).

Society also expresses demand for the protection of prehistoric and historic sites and artifacts through the laws and regulations passed to protect them, including the National Historic Preservation Act (which also created a Historic Preservation Fund to survey, document, and protect cultural resources), the Archeological and Historic Preservation Act, the Archaeological Resources Protection Act of 1979, and others (USDI National Park Service 2014).

Value

The economics literature includes studies that describe the economic importance of cultural meaning or sense of place. Some studies estimate values based on spending by visitors to cultural sites, other studies estimate the value people place on protecting cultural sites or heritage, even if they never plan to visit these locations. These studies also describe a site’s resources or attributes that contribute to cultural meaning, such as uniqueness, historical significance, or spiritual meaning (Snyder *et al.* 2003, de la Torre (ed.) 2002, and Dumcke and Gnedovsky 2013). Given the challenges of estimating the economic value of an intangible such as cultural heritage or sense of place, these studies provide insights into the importance people and societies place on these resources, rather than into a precise measure of economic value.

Cultural meaning contributes to the overall economic value of the goods and services from BLM-administered lands, though it is not possible to characterize all aspects of cultural meaning in the monetary language of economics.

The net economic benefit of recreation captures the value of some aspects of cultural meaning, as the cultural importance of an activity may be mixed with its recreational value. For example, family members may visit the Cape Blanco Lighthouse because it is the oldest lighthouse in Oregon, and hike or picnic while there. It is difficult to parse out the value they attribute to their day of recreation versus their interest in the lighthouse; there may be a premium they would place on their experience compared to another destination, but there is no applicable research to determine what this premium is.

Similarly, the value people place on the existence of sensitive species, such as salmon and the northern spotted owl may be supported or enhanced by the cultural meaning people ascribe to these species. The economic studies underlying the values reported in **Table 3-157** do not parse the cultural aspects of value from other reasons why people ascribe value to the existence of these species.

The nonmarket values reported elsewhere in this section also do not capture the value of the cultural meaning indigenous people derive from the natural environment. Across the Pacific Northwest, for example, the tribal way of life is intertwined with the ecosystem that supports the many resources tribes have used for thousands of years. In many cases, the rhythm of life and social organization revolves around the annual life cycle of plants, animals, and fish found on BLM-administered lands. These relationships are impossible—and inappropriate—to capture with a monetary measure, but they are important to these groups' economic well-being. Cultural meaning is perhaps more valuable from an economic perspective than other resources because the resources that have cultural importance are irreplaceable.

Summary

Table 3-159 summarizes the economic value of goods and services reported in the sections above. These estimates represent different metrics for estimating value, including market revenue, consumer surplus and willingness to pay, and avoided costs. They are not strictly comparable and their sum should not be interpreted as a total value. The monetary estimates capture only a part of the total economic value of the goods and services provided by BLM-administered lands because they do not include the value of goods services that are not monetizable given available data, such as source water protection, biodiversity, scenic amenities, and cultural meaning.

Table 3-159. Summary of economic value of goods and services derived from BLM-administered lands in western Oregon, 2012.

Good or Service	Type of Valuation	Economic Value in 2012
Biodiversity and Sensitive Species	Qualitative	Not Monetized
Carbon Storage	Non-Market	$99 million
Cultural Meaning	Qualitative	Not Monetized
Energy Production	Market	$0.032 million
Grazing	Market	$0.022 million
Minerals	Market	$0.015 million
Recreation	Non-Market	$222.8 million
Scenic Amenities	Qualitative	Not Monetized
Source Water Protection	Qualitative	Not Monetized
Special Forest Products	Market	BLM Revenue: $0.2 million; Market Value Low $0.4 million, Market Value High $6.5 million
Timber	Market	$20.8 million (Harvest Value)

Environmental Effects

Timber

Table 3-160 shows the total harvest volumes under the different alternatives, including both the Allowable Sale Quantity (ASQ) and non-ASQ harvest. These total harvest volumes change over time because of changes in the amount of non-ASQ harvest (see the Forest Management section in this chapter for explanation of non-ASQ volume).

Table 3-160. Annual total BLM harvest volumes over time by alternative.

Alternative	MMbf (Short Log Scale)					
	2023	2033	2043	2053	2063	2113
No Action	399.6	391.6	380.2	364.5	341.2	286.9
Alt. A	248.6	243.7	245.2	244.3	252.2	294.9
Alt. B	331.7	322.9	315.5	302.7	300.9	288.6
Alt. C	555.0	548.7	541.1	532.7	524.4	588.0
Alt. D	180.0	179.8	179.4	178.9	184.5	244.4

These harvest volumes derive from the vegetation (Woodstock) model that also provides several other measures useful in describing value differences among the alternatives and effects on BLM districts. These include gross revenues, costs, and net revenues. Based on these data, the BLM calculated the net worth of the various alternatives. As a caution, the gross revenue figures include logging costs and BLM adjustments to sale costs so that they are only a proxy for the actual revenues (harvest value) that the government would receive under the alternatives.

The ten-year timber gross revenues would be highest for all time periods under Alternative C, and lowest for all time periods under Alternative D (**Figures 3-145** and **3-146**). Gross revenues would be generally stable across the 10-year periods, although Alternatives A, B, and D fluctuate similarly while Alternative C differs, rising in the fourth decade, for example. For the first decade (2014-2023), total revenues would range from a low of approximately $843 million under Alternative D to a high of $2.8 billion under Alternative C **(Table 3-161**) These variations result from the timing of harvests of high value timber versus low value thinning harvests, and differences in the costs of harvest techniques.

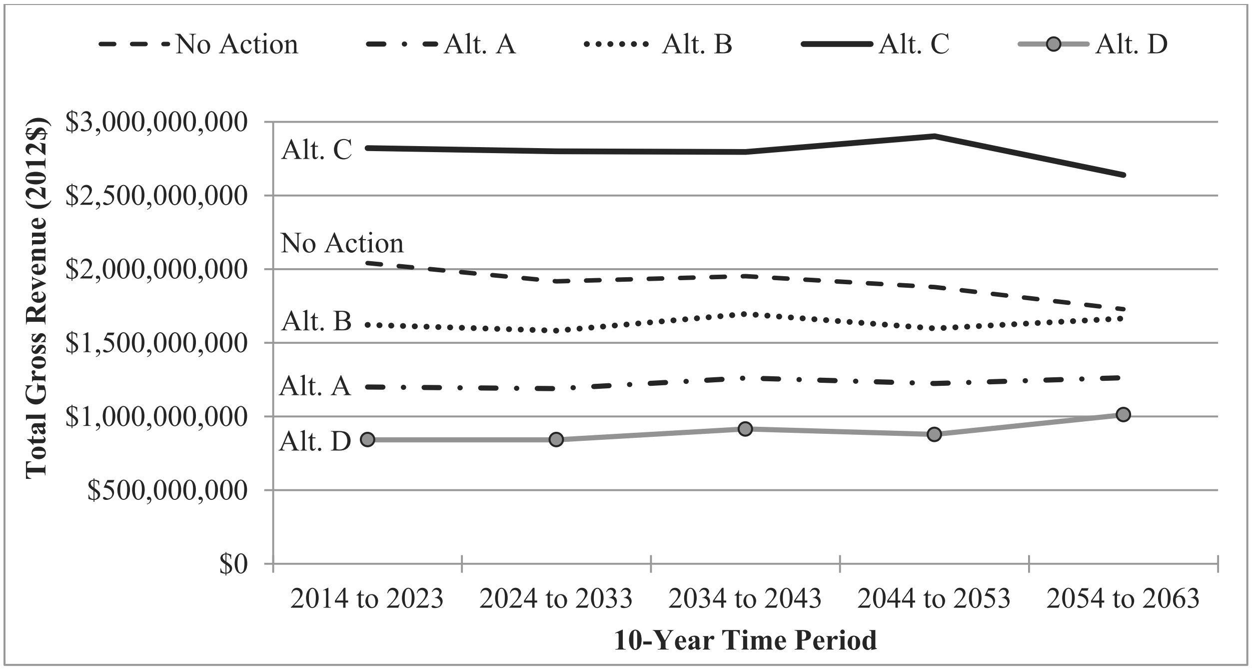


Figure 3-145. Timber gross revenue over time, by alternative, and 10-year period.
Note: Year represents last year of 10-year period, and values are the 10-year sum. Source: Based on calculations using the Woodstock Model. 2012$.

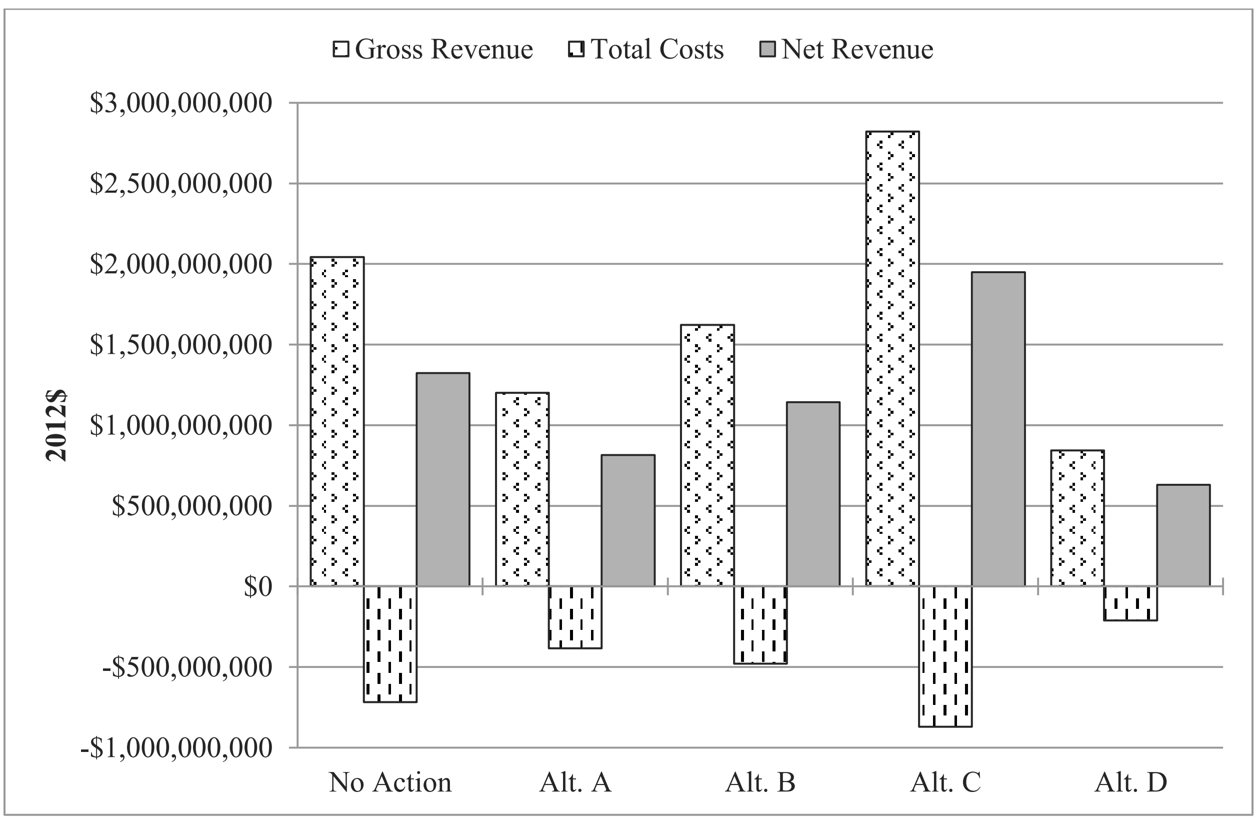


Figure 3-146. Gross revenue, total costs, and net revenue, by alternative, 2014 to 2023 ($ Millions).
Source: Based on calculations using the Woodstock Model. 2012$.

Table 3-161. Gross revenue, total costs, and net revenue, by alternative, 2014 to 2023 ($ Millions).

Alt.	District/Field Office	Gross Revenue Totals (2014-2023)	Total Costs (2014-2023)	Net Revenue Totals (2014-2023)	Net Present Value Over 50 Years (2014-2063)
No Action	Coos Bay	$370	$125	$245	$478
	Eugene	$426	$143	$283	$591
	Klamath Falls	$35	$18	$17	$41
	Medford	$470	$171	$299	$612
	Roseburg	$396	$142	$254	$522
	Salem	$345	$119	$226	$458
	Totals	**$2,042**	**$718**	**$1,324**	**$2,701**
Alt. A	Coos Bay	$226	$84	$143	$327
	Eugene	$285	$97	$188	$437
	Klamath Falls	$12	$1	$11	$24
	Medford	$203	$51	$152	$286
	Roseburg	$144	$51	$93	$182
	Salem	$330	$101	$229	$498
	Totals	**$1,200**	**$385**	**$815**	**$1,755**
Alt. B	Coos Bay	$236	$91	$145	$307
	Eugene	$381	$133	$248	$574
	Klamath Falls	$30	$4	$26	$54
	Medford	$322	$36	$286	$557
	Roseburg	$221	$78	$142	$300
	Salem	$432	$137	$295	$637
	Totals	**$1,622**	**$479**	**$1,142**	**$2,428**
Alt. C	Coos Bay	$533	$178	$355	$724
	Eugene	$742	$237	$505	$1,150
	Klamath Falls	$39	$14	$25	$55
	Medford	$364	$85	$279	$558
	Roseburg	$480	$155	$324	$647
	Salem	$662	$200	$462	$1,016
	Totals	**$2,821**	**$871**	**$1,950**	**$4,151**
Alt. D	Coos Bay	$103	$30	$73	$171
	Eugene	$210	$45	$164	$391
	Klamath Falls	$20	$7	$13	$29
	Medford	$155	$31	$124	$227
	Roseburg	$110	$31	$79	$166
	Salem	$244	$68	$177	$422
	Totals	**$843**	**$212**	**$630**	**$1,406**

Costs and net revenue correspond proportionally to the alternatives. For example, Alternative C would have the greatest gross and net revenues, while Alternative D would have the least (**Figure 3-146**). Net revenues for the 2014 to 2023 period would be approximately $630 million under Alternative D, and approximately $2 billion under Alternative C.

The discounted net present value of the alternatives for the 50-year period (2014 to 2063) (i.e., the value if all the revenue were realized in 2012) would range from approximately $1.4 billion under Alternative D to approximately $4.1 billion under Alternative C (**Table 3-161** and **Figure 3-147**). The net present value would greatest for the Salem District under Alternatives A, B, and D, and greatest for the Eugene District under Alternative C.

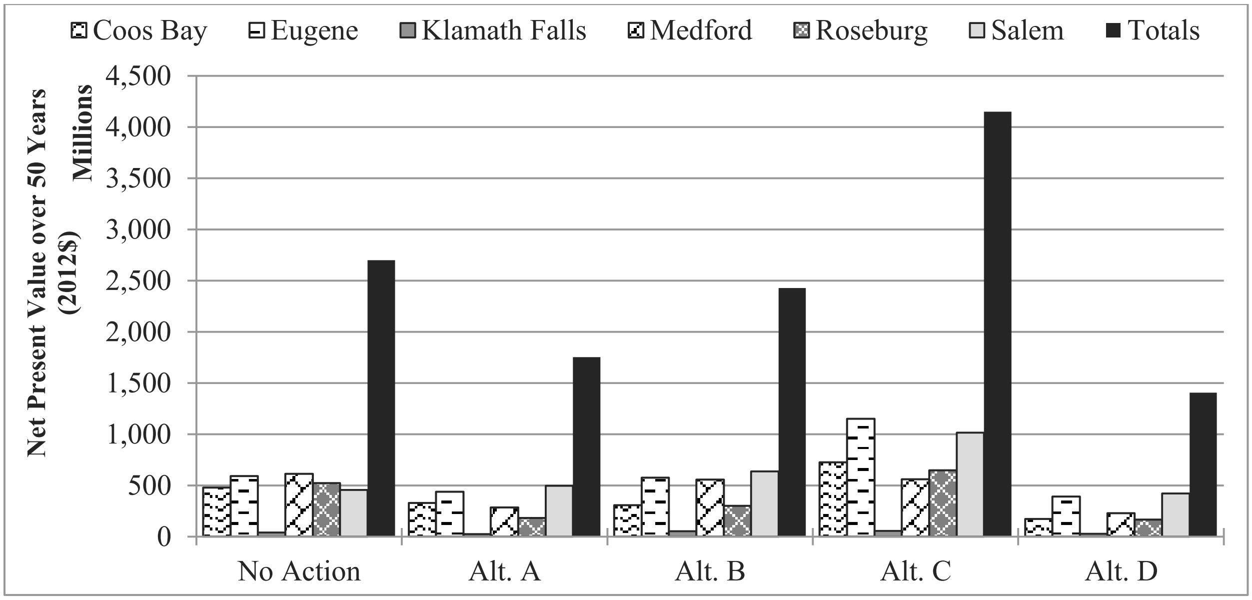


Figure 3-147. Net present value over 50 years (2014 to 2063) by office and alternative.
Note: The values are in base 2012$ using a discount rate of 4 percent.

The Forest Management section in this chapter details the differences in value of logs harvested in terms of grade over time, by alternative. These differences help explain the differences in net present value among the alternatives. Alternative C would have its highest value harvests early in the timeframe, while Alternative D would have its highest value harvests at the end of the timeframe. Discounting results in more heavily weighing benefits in the present than in the future.

Logging costs per thousand board feet (Mbf) would vary by office and by alternative (**Figure 3-148**). These costs would change as harvest prescriptions differ among alternatives, the biggest difference being the extent of thinning versus regeneration harvests. Costs in the Klamath Falls Field Office would be particularly low during the first time period relative to other offices under Alternatives A and B, and more in line with other offices under Alternatives C and D. In contrast, the Coos Bay District would have the highest costs per unit, but they would be approximately $40 lower per Mbf under Alternative D. Across all offices, in the first five decades, Alternatives B and D would have the highest per unit costs, while Alternative A would have the lowest. Among all the alternatives, Alternative D would have the lowest gross revenues, costs, and net revenues, (**Figure 3-148**).

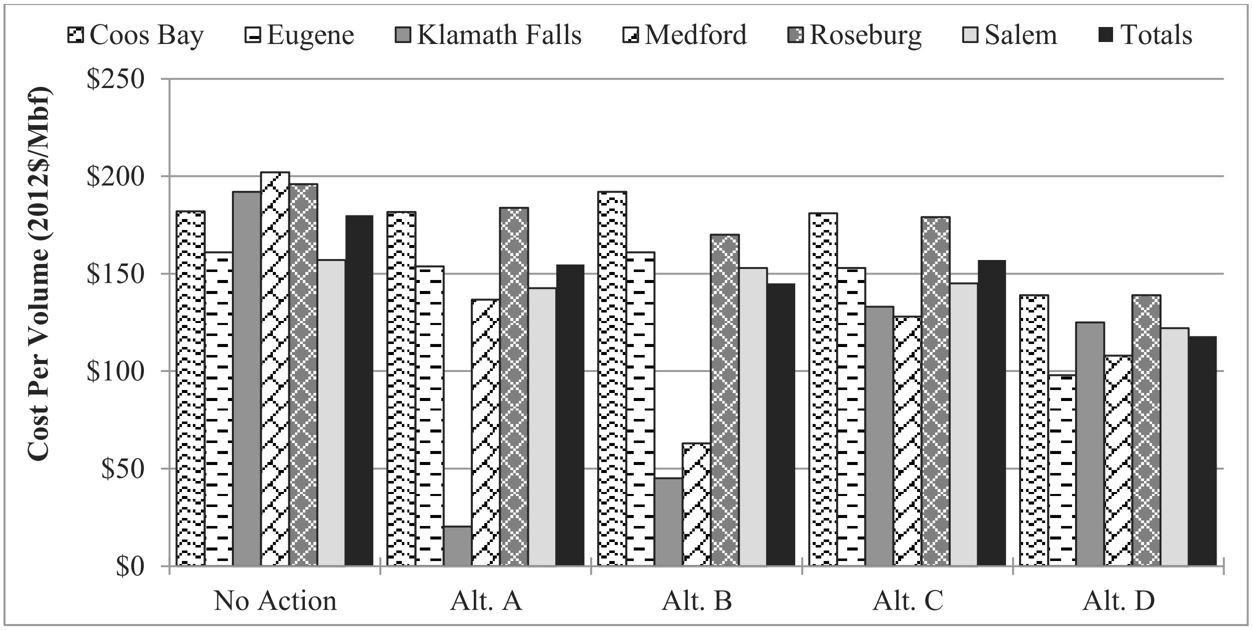


Figure 3-148. Cost per volume by office by alternative, 2014 to 2023 (2012$).
Note: Costs are in short log units, in 2012$.

Stumpage prices (the value of standing timber) for the first decade would be lowest for the Klamath Falls Field Office and highest on average for the Medford District during the first 10-year period (**Figure 3-149**). The Roseburg District would have the highest prices under Alternative C. Alternative C would have the highest overall stumpage prices ($324/Mbf) averaged across all offices, and Alternative D would have the lowest ($277/Mbf). Stumpage prices rise back to their long term trends levels by 2018 and afterwards rise at their long-term real rate of increase of 0.23 percent (see Value discussion in Affected Environment). Stumpage prices would differ among alternatives and across time as a function of changes in the mix of log grades and average logging costs. Log mixes change over time both as a function of timber inventory changes and the differences in prescriptions for harvest, such as oldest first and extent of thinning.

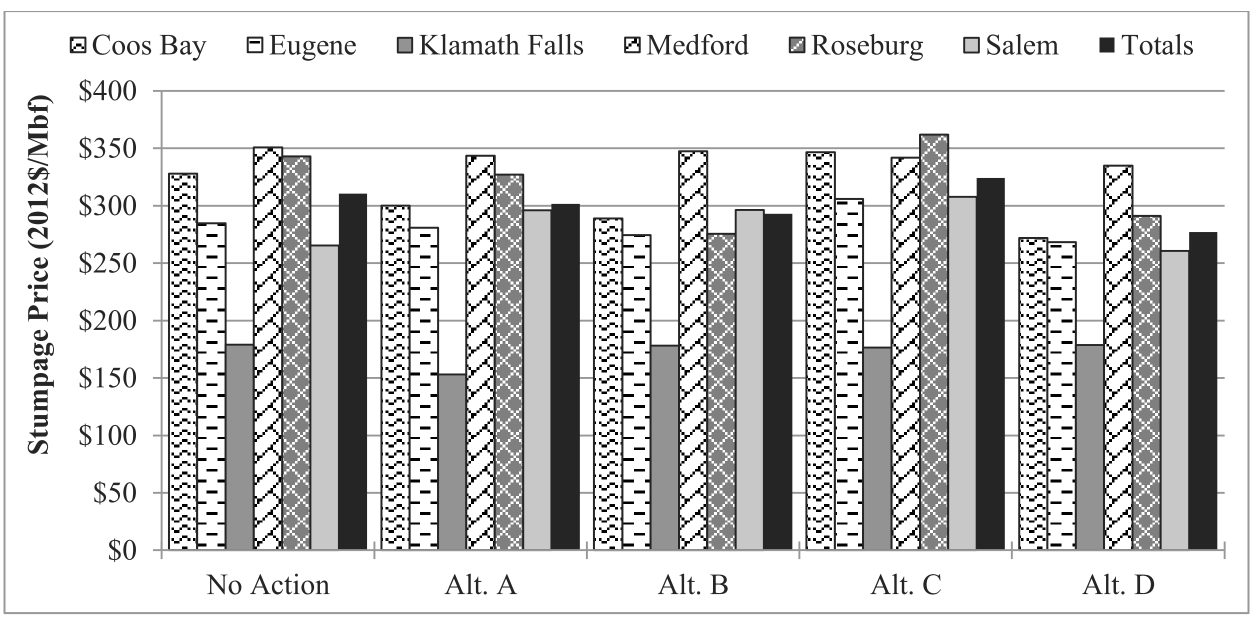


Figure 3-149. Stumpage price by office by alternative, 2014 to 2023 (2012$).

Note: Prices are in short log units.

The differences in log grade composition help explain the variation in market value of timber harvests by alternative. Grade 1 contains logs that are generally sawlogs or peelers. As such, they represent the highest value log mixes and proportional changes in that mix are reflected in differences in stumpage prices both over time and among alternatives. **Table 3-162** shows the differences in proportion of Grade 1 logs by alternative over time. Among the alternatives, Alternative C would have the greatest share of Grade 1 logs early in the harvest timeframe, declining to nearly the lowest share by the end of the timeframe. Discounting weighs early harvests as more valuable than later harvests in the economic calculation of net present value. Conversely, Alternative D would have the lowest proportion of Grade 1 logs early in the timeframe, and the highest at the end. Stumpage prices are higher for higher grade logs, so the patterns in stumpage price would change over time, as Alternative C would shift to lower grade logs and vice versa for Alternative D (**Table 3-163**). Logging costs do not fluctuate with log grade as dramatically as stumpage prices, but rather reflect the different harvest practices by alternative such as extent of thinning versus final harvest for a site.

Table 3-162. Timber Grade 1 proportion over time, by alternative.

Alternative	2023	2033	2043	2053	2063	2113
No Action	24%	16%	16%	12%	10%	14%
Alt. A	15%	14%	6%	8%	8%	1%
Alt. B	18%	10%	6%	6%	12%	18%
Alt. C	21%	19%	12%	9%	9%	2%
Alt. D	13%	12%	7%	8%	18%	21%

Table 3-163. Timber stumpage prices over time, by alternative.

Alternative	2023	2033	2043	2053	2063	2113
No Action	$310.4	$287.8	$309.7	$311.8	$302.3	$317.4
Alt. A	$301.6	$300.6	$312.1	$300.2	$306.8	$264.8
Alt. B	$292.9	$283.6	$314.4	$308.1	$337.9	$350.2
Alt. C	$324.0	$323.4	$320.7	$339.8	$309.3	$264.8
Alt. D	$277.0	$271.7	$295.7	$284.8	$332.3	$351.1

Table 3-164 shows total harvest values computed as the product of the harvest quantities from **Table 3-160** and the stumpage prices from **Table 3-163**. These represent estimates of returns to the government derived from timber harvested from BLM-administered lands in western Oregon and may be compared to the harvest values in **Table 3-146-** $20.8 million in 2012. The estimates are considerably higher than the value in 2012, because both timber harvest volumes and values would be higher under the alternatives.

Table 3-164. Total harvest values by alternative 2023 to 2113 (2012$).

Alternative	Average Annual Harvest Value $ Millions (2012$) for Selected Decades					
	2023	2033	2043	2053	2063	2113
No Action	93.0	84.5	88.3	85.2	77.4	68.3
Alt. A	56.2	54.9	57.4	55.0	58.0	58.6
Alt. B	72.9	68.7	74.4	69.9	76.3	75.8
Alt. C	134.9	133.1	130.1	135.8	121.7	116.8
Alt. D	37.4	36.6	39.8	38.2	46.0	64.3

Market Impacts of Changes in BLM Harvests

The above discussion of the impacts of changes in BLM harvests does not take into account the potential responses of other non-BLM timberland owners.[70] In the case of increases in BLM harvests, there would be reductions in private harvests as timberland owners adjust their harvest downwards as prices fall. Both of these results could reduce the potential job and revenue expectations from increases in the BLM harvest (as presented under Issue 2 Environmental Effects). For example, the BLM might expect the full employment impacts associated with an increase in harvest, but the net change in employment would be reduced by reductions in private harvests. At the same time, expected revenues would be less than expected, as stumpage prices are reduced by the net increase in harvest volumes.

The BLM estimated the expected economic responses to increases in timber supply associated with increases in BLM timber harvests using a model of western Oregon timber markets (**Table 3-165**). Appendix O includes a detailed description of the model. The analysis assumed full implementation of each alternative prior to the mid-point of the first decade, so that harvest levels have risen to their expected levels by 2018.

Table 3-165. Market impacts on other timberland owners by BLM alternative in 2018 (2012$) long log scale table.

Alternative	BLM Harvest Volume (MMbf)	BLM Harvest Change Relative to 2012 (MMbf)	Stumpage Price (Per Mbf) (Resulting from Alternatives)	Total Western Oregon Harvest (All Producers) (MMbf)	Stumpage Price Difference (Per Mbf), Alternatives versus 2012	Change in Total Western Oregon Harvest (MMbf) Alternatives versus 2012	Change in Stumpage Price, Alternatives versus 2012 (%)	Change in Harvest Volume, Total Western Oregon Harvest (%)	Estimated Change in Private Harvest (MMbf)[1]
Reference Data (2012)	144.3		$177.3	3,354.2					
No Action	281.0	136.7	$168.2	3,453.0	$-9.1	98.8	-5%	3%	-37.9
Alt. A	172.4	28.1	$175.4	3,374.5	$-1.9	20.3	-1%	1%	-7.8
Alt. B	230.2	85.9	$171.6	3,416.2	$-5.7	62.1	-3%	2%	-23.8
Alt. C	390.9	246.7	$160.9	3,532.5	$-16.4	178.3	-9%	5%	-68.4
Alt. D	123.9	-20.4	$178.6	3,339.5	$1.4	-14.7	1%	<-1%	5.6

[1] BLM harvest change relative to 2012 minus change in total western Oregon harvest.

Notes: The price per Mbf is based on actual market prices, see **Table 3-146**. These prices are lower than the stumpage values used in the vegetation modelling, see **Table 3-163** and discussion.

The model expresses volumes and prices in long log scale as that is the common log scale in western Oregon. In short log scale, the changes in BLM harvests and prices are as shown in **Table 3-166**.

[70] There are four broad types of timberland ownerships: Forest Service; other public, which in western Oregon includes the BLM, the State of Oregon, and various counties; forest industry; and non-industrial private forests.

Table 3-166. Harvests and prices by BLM alternative in short log scale.

Alternative	Harvest (MMbf)	Price (per Mbf)[1]
No Action	399.6	$118.3
Alt. A	248.6	$121.7
Alt. B	331.7	$119.1
Alt. C	555.0	$113.3
Alt. D	180.0	$123.0

[1] Prices are in 2012 $ and converted from long to short log scale using a conversion factor of 1.435.

Under all of the alternatives other than Alternative D, the BLM harvest would increase relative to 2012 levels, between 28 and 247 MMbf. This upward shift in the supply curve would lead to lower stumpage prices (between one and nine percent) and reductions in private harvests (between approximately eight and 68 MMbf), as timberland owners adjust their harvest downwards as prices fall. For example, under the No Action alternative, stumpage prices would fall by $9.10 (2012$) per thousand board feet (five percent), while the total western Oregon harvest would expand by approximately 99 million board feet (3 percent), as private timberland owners would reduce their harvest by approximately 37.9 million board feet. Both of these effects would reduce the potential expectations for an increase in BLM harvest. The BLM considered this likely market reduction effect in the economic activity analysis (jobs and earnings) below in Issue 2.

These results illustrate the extent that private timberland owners respond to changes in stumpage prices associated with the increased changes in BLM harvest flows. The drop in stumpage prices may also lead to lower expectations about timber as a capital asset among private timberland owners and reduced market incentives for practices that contribute to sustained yield management.

Markets are constantly changing, and once a change is introduced in one region, timberland owners, producers, and consumers in other regions all react to those changes, reducing the impacts in the first region as production changes in other regions. Analysis of the time dimension of these market impacts suggest that they diminish over the following decade, so that market adjustments are only prevalent in the first two decades of any projections.[71]

Recreation and Visitation

The alternatives define differences in areas designated and developed for recreation purposes, in some cases targeted at one or more specific activities such as mountain biking or OHV use. Variation in total acreage in Recreation Management Areas (RMAs) is substantial, as Alternative A in total would have approximately 12 percent the area under Alternative B,[72] (**Table 3-167**). Alternative C would be approximately 2.5 times the area of Alternative B, and Alternative D would be four times Alternative B. Acreages in the individual districts follow these area-wide orderings by alternative, although while the

[71] For examples of this diminishing price effect of changes in harvest, see Table 41 in Haynes *et al*. 2007. The USDA FS 2005 RPA timber assessment update. Gen. Tech. Rep. PNW-GTR-699. Portland. OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 212 p.

[72] Under the No Action alternative, all BLM-administered lands in the decision area are allocated to RMAs, and the management of RMAs described in the 1995 RMPs differs from current definitions and policy. Therefore, the assumptions about the benefits of RMA management under the action alternatives are not applicable to the RMAs under the No Action alternative. Alternative B represents an approximate continuation of the current recreation management, but consistent with current definitions and policy for RMAs. Therefore, the economic benefits of RMA management under Alternative B best approximates the economic benefits under the No Action alternative.

Klamath Falls Field Office would have the most acreage under Alternative B, Medford would have the most acreage among all other alternatives. Recreation and Visitor Services contains more detail on the differences in the RMAs.

Table 3-167. BLM Recreation Management Area acres by alternative.

District/Field Office	No Action[1] (Acres)	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)	Alt. D (Acres)
Coos Bay	6,629	468	6,629	15,258	21,359
Eugene	20,511	104	20,511	24,211	34,967
Klamath Falls	67,933	598	67,933	97,293	216,134
Medford	32,065	17,199	32,065	181,991	267,404
Roseburg	6,984	166	6,984	41,493	42,916
Salem	28,647	1,515	28,647	56,567	84,371
Totals	**162,770**	**20,050**	**162,770**	**416,812**	**667,151**

[1] Per **Table 3-147**, this table uses the acres in Alternative B as the best approximation for the No Action alternative.
Acreages include all RMAs, both Special and Extensive.

An important differentiator among the alternatives is designation of some RMAs for exclusion of particular recreation activities, for example, excluding activities (e.g., OHV use) that might disrupt other activities (e.g., hiking). The closures identify areas that would be designated for more rustic and natural recreation opportunities (**Table 3-168**). The primary activity targeted for closures would be target shooting, followed by OHV use. Closure acreages correspond proportionally to RMA total acreages by alternative.

Table 3-168. Recreation opportunities, acres restricted within the decision area.

Recreation Opportunities	No Action (Acres)	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)	Alt. D (Acres)
Equestrian Use	8,828	1,048	8,828	49,414	63,620
Mountain Bicycling	13,814	1,248	13,814	57,490	75,402
Off-Highway Vehicle Use	49,969	17,517	49,969	87,261	105,474
Overnight Camping	18,006	829	18,006	60,205	66,611
Target Shooting	41,681	18,236	41,681	66,407	135,464

Note: Per **Table 3-147**, this table uses the acres in Alternative B as the best approximation for the No Action alternative.

Acreage is an important characteristic for recreation areas, but trail mileage is as well. The RMAs do not yet define trail miles, but extrapolating from available trail miles per acre of RMA under current conditions allows an approximation of the number of trail miles that would be available under each alternative. Currently, there are approximately 395 miles of identified trail miles on BLM-administered lands in western Oregon. This could increase to 1,000 miles under Alternative C, or to 1,600 miles under Alternative D (**Table 3-169**). Some RMAs would be more conducive to greater or lesser trail densities.

Table 3-169. Potential trail miles in RMAs.

District/Field Office	No Action (Miles)	Alt. A (Miles)	Alt. B (Miles)	Alt. C (Miles)	Alt. D (Miles)
Coos Bay	35	2	35	81	114
Eugene	46	-	46	54	78
Klamath Falls	29	-	29	42	92
Medford	146	79	146	831	1,221
Roseburg	39	1	39	230	238
Salem	100	5	100	197	294
Totals	**395**	**49**	**395**	**1,012**	**1,619**

Source: USDI BLM, estimated from trail densities by district. Table uses Alternative B as the best approximation for the No Action.

Demand for recreation determines the value for the recreation designations by alternative. That is, if there is no demand, there is no participation and use, and therefore there is no recreation value. Demand for outdoor recreation, as discussed earlier, relates particularly to individual preferences, proximity and accessibility. Recreation opportunities that are close to population centers experience the most participants and visitor-days, and consequently the most value, all else equal. While many factors can lead to variation in value of a visitor-day, the number of visitor-days is the primary factor the BLM utilizes to estimate the economic value of recreation areas. Accessibility and congestion are two fundamental factors that, when they improve, will improve the quality and therefore value of a visitor-day. Focusing on elements of RMA designation that are close to communities, thereby increasing the availability and accessibility of recreation opportunities while reducing congestion provides the most fundamental basis for estimating increases in value. The increase in value can manifest as both higher value for visits that would have occurred anyway, as well as increased visitor-days. Focusing on opportunities close to communities provides the strongest basis for estimating increases in value, and therefore, potentially, an underestimate by not including visitation outside of those community proximities.

When considering the RMA acreages under the alternatives in terms of proximity to the target population centers in western Oregon, the overall acreage accessible within 30-minute and 60-minute driving distances under each alternative track with their overall RMA acreage (**Table 3-170**). Moving out from 30-minute distances to 60-minute distances increases the accessible recreation area by more than double, and increases to five or six fold under Alternatives B, C, and D. While all districts would see increased RMA acreage with increased total RMA acreage progressively from Alternative A through D, Grants Pass and Medford would experience the highest increase in accessible RMA acreage under Alternatives C and D (**Figure 3-150**).

Table 3-170. RMA acreage by driving proximity from population centers in western Oregon.[1].

Drive-Time	No Action (Acres)	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)	Alt. D (Acres)
30-Minute	12,473	5,849	12,473	52,232	56,814
60-Minute	60,893	13,070	60,893	252,005	311,855

[1] Major population centers include Coos Bay, Corvallis, Eugene, Grants Pass, McMinnville, Medford, Newburg, Portland, Roseburg, Salem, Sandy and Tillamook.
Table uses Alternative B as the best approximation for the No Action alternative.

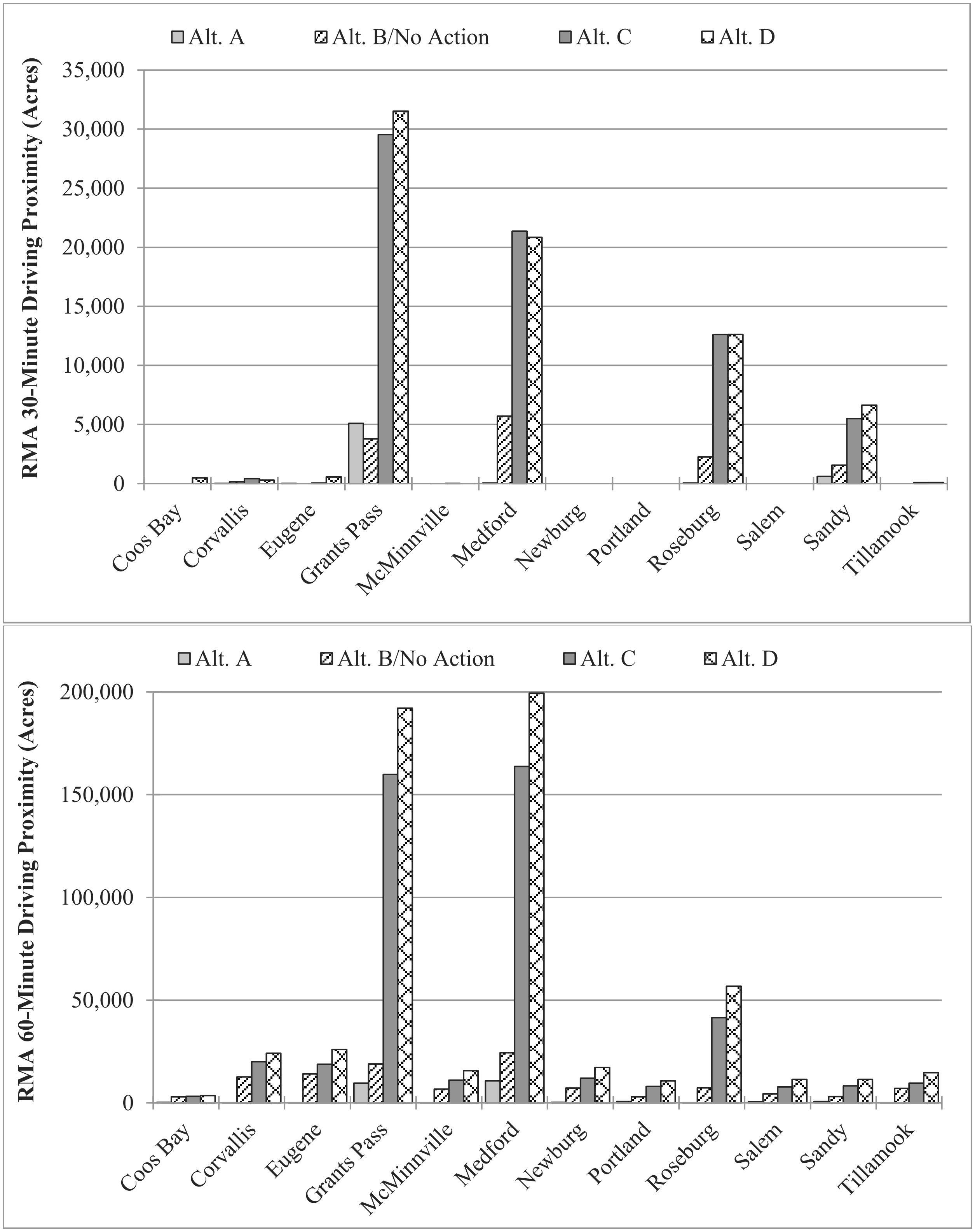


Figure 3-150. RMA acreage by driving proximity of western population centers, 30 and 60 minutes.

Note: No Action would be the same as Alternative B.

Increased recreation opportunities do not necessarily result in proportionate increases in participation and visitor days. The BLM currently provides approximately one-third of all public land within an hour's driving distance of the major population centers. If the BLM-administered areas close to such communities were improved to provide more and better recreation opportunities, the additional demand could be substantial. Because of population growth and increasing interest in outdoor recreation, participation numbers and visitor days are both expected to increase over time (see Recreation). Ignoring this across-the-board increase in demand and resulting use and value, if visitation increased proportionally to acreage of the RMA by alternative within the 60-minute driving distances of western Oregon's major population centers, the average annual net benefit would additionally increase.

At the land use plan level, the BLM will not define specific recreation improvements for the RMAs under the alternatives. Therefore, it is not possible to develop a precise estimate of changes in visitor-days and types of recreation by alternative. However, BLM is increasingly developing recreation opportunities in response to demand. Therefore, the visitation rates for new recreation resources could be greater than those for current resources. For example, the BLM's trail network at Sandy Ridge is experiencing use levels unprecedented in the region. With the current trend in improvement for design and desirability of the BLM's recreation resources, the number of visitors could continue to increase. The overall increase in population and preferences for outdoor recreation further bolster the potential for visitation to increase.

Based on the projections for increases in participation across the BLM's recreation activity categories, annual consumer surplus values provided by outdoor recreation would increase over the next 50 years. By 2023, the consumer surplus value estimate would increase from $222 million to $250 million (**Table 3-171**) This assumes visitor-days would increase proportionally to participants, and the trends through 2060 would extend through 2063. Summing the annual values discounted at four percent starting in 2014 for 50 years results in over $5 billion in consumer surplus value (**Table 3-171**). If visitor-days and the quality of visits increased with the increased RMA acreage these values could be even greater under Alternatives C and D.

Table 3-171. Consumer surplus value projections.

Activity	Total Net Benefit (Consumer Surplus) (Thousands of 2012$)		
	2012	2023	2014-2063 Projected Net Present Value[1]
Camping and Picnicking	$111,728	$125,472	$2,734,077
Driving for Pleasure (Along Designated BLM Roadways)	$9,020	$10,153	$221,473
Fishing	$9,528	$10,529	$227,700
Hunting (Big Game, Upland Game, and Migratory Game Birds)	$26,122	$27,286	$573,829
Motorized Boating	$1,332	$1,550	$34,337
Motorized Off-Highway Vehicle Travel	$13,014	$14,504	$314,916
Non-motorized Boating	$2,454	$2,766	$60,383
Non-motorized Travel (Hiking, Biking, and Horseback Riding)	$9,558	$11,042	$243,710
Non-motorized Winter Activities	$842	$1,021	$22,998
Snowmobile and other Motorized Winter Activities	$81	$91	$1,990
Specialized Non-motorized Activities and Events	$4,244	$4,790	$104,616
Swimming and Other Water-Based Activities	$3,436	$3,950	$86,983
Wildlife Viewing, Interpretation, and Nature Study	$31,512	$35,712	$781,460
Totals	**$222,872**	**$250,131**	**$5,408,472**

[1] Four percent discount rate.
Sources: **Table 3-150**; **Table 3-126** in Recreation.

Special Forest Products

Land area suitable for the production of Category I (disturbance-associated) and Category II (disturbance-averse) special forest products would vary by alternative and over time. In both the coastal/north and interior/south regions, across all alternatives, the acres suitable for the production of Category I goods would not exceed one-quarter of the total acreage in the decision area, whereas at least three-quarters of the acres in the decision area would support production of Category II goods. Over time and across all alternatives, the acreage suitable for Category I products would peak from 2033 to 2053 and diminish after 2063. Alternative A would provide the fewest acres suitable for the production of Category I products and would have the least variation over time in both the coastal/north and the interior/south regions. In the coastal/north region, Alternative C would provide the most land suitable for Category I harvests. In the interior/south areas, Alternative B would provide the most harvestable land for Category I products. See the Forest Management section in this chapter for a detailed presentation of the effects of each alternative on special forest products.

As the acres of land suitable for the production of Category I and Category II products shift by alternative, the supply of each type of special forest product would change. Decreases in Category I acres would translate to increases in Category II acres, resulting in an increase in the supply of special forest products that thrive in undisturbed landscapes and a decrease in those that grow in disturbed landscapes. This has the potential to affect the marginal value of products in both categories, especially where there would be large changes in supply.

Both Category I and Category II lands include some higher value and some lower value products. Mushrooms, floral and greenery, and Christmas trees are the groupings of products that people harvest in the greatest quantity and, thus, produce the most revenue for the BLM. Category I and Category II landscapes both supply floral, greenery, and mushrooms, whereas only Category I lands supply Christmas trees. Based on the BLM's available data, it is not possible to quantify how changes in the acres suitable for the production of Category I and Category 2 goods would affect the overall value of special forest products produced by BLM-administered lands in western Oregon. However, even Alternatives B and Sub-alternative C, which would have the highest conversion of land from disturbed to undisturbed characteristics, would result in relatively small changes and would likely have a small effect on the overall supply, and thus the value, of each category of special forest product in the decision area.

Sustainable Energy Production

Energy production from solar and geothermal resources would not vary across alternatives, for two reasons: 1) the alternatives would only modestly impact the availability of any of these resources for development, and, 2) the development of these resources is constrained not by supply but by lack of demand related to market conditions, and limited infrastructure and conveyance capacity to population centers. The Sustainable Energy section in this chapter discusses these limitations in more detail. The supply of BLM-administered land available for granting a right-of-way for wind development and transmission corridors would decrease across all alternatives (although all alternatives would decrease the acres excluded for development, they would increase the acres in avoidance areas). Alternative D would have the greatest decrease, and Alternative A the least. If demand for these resources aligns with the characteristics of the supply on BLM-administered lands in the future, these restrictions would limit the potential economic value of this resource.

The supply of biomass would vary across alternatives, so the potential for energy production from biomass would also vary. Biomass production is a direct function of timber harvest, so the alternatives with greater timber harvest would produce greater amounts of biomass. Alternative C would produce the most biomass. Alternative D would produce the least amount of biomass.

The value of biomass depends on demand. Under today's market conditions, woody biomass is not cost competitive with fossil fuels (White 2010). This may change as technology evolves, fossil fuel prices increase, and infrastructure develops to utilize woody biomass close to where it is produced. If these developments occur, the value of woody biomass from BLM-administered lands would increase.

Grazing

The supply and value of grazing would not change by alternative, except under Alternative D, which would eliminate grazing. The No Action alternative, and Alternatives A, B, and C, would have no impacts on active or billed AUMs relative to current conditions, and would also have no impact on BLM revenues from grazing, so that the BLM would continue to receive about $22,000 per year from grazing fees. Alternative D, which has no grazing, would reduce active and billed AUMs to zero, and, consequently, would also reduce BLM revenues from grazing to zero.

Minerals

As of 2012, mineral revenues to the BLM were minor (approximately $15,000) and would not change by alternative. Under the alternatives, the acres open to saleable mineral entry would increase slightly relative to current conditions. Approximately 13 percent of BLM-administered lands are currently closed to salable-mineral exploration. That percentage would decline to 9 to 11 percent under the action alternatives. The acres that would be closed under each alternative would be small relative to the acres open to production, and the areas that would be closed are not suitable for quarry development. The closure of these areas under any alternative would not appreciably affect the quantity or value of saleable mineral materials derived from BLM-administered lands.

The alternatives would decrease by a small amount the number of acres open to locatable-mineral exploration. Currently, this type of mineral exploration can happen on 96 percent of BLM-administered lands. The action alternatives would reduce this percent to 88 to 90 percent. The closure of these areas under any alternative would not appreciably affect the quantity or value of locatable minerals derived from BLM-administered lands.

The alternatives would have no effect on the acres of BLM-administered land open to leasable-mineral exploration. The alternatives would have no effect on the acres of BLM-administered land open to leasable-mineral exploration.

Carbon Storage

Table 3-172 shows the marginal change in net carbon storage and value by alternative for the first decade of the analysis (2013-2022) and for the entire period of analysis (2013-2113). The amount of stored carbon, and value of stored carbon, would increase across all alternatives in the first decade and over 100 years. Alternative C would result in the lowest increase and Alternative D would result in the highest increase. By 2113, the differences among alternatives would become more pronounced, with most carbon stored and the highest value under Alternative D. Alternative C would store the least amount and have the lowest value.

Table 3-172. Value of carbon storage by alternative, 2012$.

Alternative	Marginal Change in Stored Carbon 2013-2022 (MMT)	Value of Stored Carbon 2013-2022		Marginal Change in Stored Carbon 2013-2022 (MMT)	Value of Stored Carbon 2013-2113	
		SCC Average 3% (Millions)	SCC 95th Percentile 3% (Millions)		SCC Average 3% (Millions)	SCC 95th Percentile 3% (Millions)
No Action	8.5	$1,314.6	$3,909.7	200.0	$56,293.9	$174,436.9
Alt. A	11.6	$1,794.0	$5,335.6	222.3	$62,574.7	$193,899.2
Alt. B	10.7	$1,650.2	$4,907.8	206.1	$58,025.3	$179,801.9
Alt. C	3.5	$545.9	$1,623.7	152.9	$43,039.7	$133,366.2
Alt. D	15.1	$2,327.5	$6,922.4	243.2	$68,469.9	$212,166.4

Sources: Carbon storage amounts come from the Climate Change section. Values are from Interagency Working Group on the Social Cost of Carbon (2013), using estimates from 2017 for the first period and 2050 for the entire 100 years, a 3 percent discount rate, and adjusted to 2012$. For more detail on these calculations, see the methods section.
MMT- Million metric tons, SCC-Social cost of carbon

Emissions from activities included in the alternatives but not incorporated into the net carbon storage number (e.g., biomass combustion, mineral production, and livestock grazing) would further offset net carbon storage, though the amount of these emissions is small compared to the emissions that are already reflected in the net carbon storage values reported above. Emissions from all sources would be highest under Alternative C and lowest under Alternative D. Therefore, the net carbon storage and associated value would be highest under Alternative D and lowest under Alternative C.

Source Water Protection

The BLM would continue protecting the value of source water in the planning area across all alternatives. The alternatives would maintain current water-quality conditions primarily by relying on the natural filtration and temperature-control services provided by Riparian Reserves that surround streams and other water bodies, and by employing best management practices (BMPs). The Riparian Reserve would shade streams, prevent temperature increases, and minimize or prevent sediment runoff from harvest activities. In addition, BLM would employ preventative BMPs along forest roads and in harvest areas. These preventative measures would minimize forest-management risks affecting drinking water and treatment costs, and would maintain DEQ's water quality criteria and standards. Also, the BLM would continue working with local watershed associations and community water supply agencies to minimize the potential impacts of activities on BLM-administered lands, such as timber sales, on water supplies.

Biodiversity and Sensitive Species

To the extent that an alternative would degrade the quality of, or reduce the supply of, habitats or populations of sensitive species, it would negatively affect resources that households in the region and the United States value. Conversely, alternatives that would protect the quality of, or increase the supply of habitats or populations, would protect or positively affect resources that households' value.

In general, Alternatives A and C would result in less increase in the acreage of structurally-complex forests than other forests, and thus would support less of an increase from current levels of biodiversity resources and values. The No Action alternative and Alternatives B and D would yield more of an increase in structurally-complex forests than Alternative A and C. See the Forest Management section for more information on these differences. Data are unavailable to estimate the magnitude of the change in economic value these changes in forest complexity would have.

- All of the action alternatives would increase the potential for habitat loss for the Oregon silverspot butterfly, relative to the No Action alternative. The action alternatives would degrade or negatively affect a resource that households' likely value given available research. However, habitat for this species on BLM-administered lands constitutes less than 1 percent of the habitat in the planning area, limiting any potential economic effect.
- All of the alternatives, including the No Action alternative, would sustain populations of bald and golden eagles. This would protect the economic values associated with these populations.
- The No Action alternative would lead to the continued loss of habitat for the fisher, while all of the action alternatives would increase fisher habitat in 50 years. Thus, the No Action alternative would diminish the well-being of people who care about the fisher. Data are not available to quantify the extent to which households would be willing to pay to protect the fisher or its habitat. All other action alternatives would result in an increase in fisher habitat over time and their associated values.
- All the alternatives, including the No Action alternative, would slightly reduce nesting habitat for the marbled murrelet (by one to four percent) in the first decade, but, by the second decade, the amount of high quality nesting habitat would surpass current amounts and would continue increasing in the later decades. Thus, all alternatives would protect values associated with marbled murrelets over the long-term.
- Under all alternatives, BLM would increase the amount of northern spotted owl habitat over time. Such actions would help protect the values that households place on this resource.
- None of the alternatives would have any measurable effects on populations or habitats of sage-grouse, gray wolf, streaked horned lark, wolverine, Taylor's checkerspot butterfly, Fender's blue butterfly, or Steller's sea lion or their value.

Scenic Amenities

The total acres in each visual resource class would vary across alternative. As acres shift from lower to higher classes (i.e., become more disturbed), the potential for reductions in the value associated with scenic amenities, such as decreases in property values would increase. The potential change in economic value would be greatest in areas adjacent or within view of residences, businesses, and communities where the visual quality would decrease from an undisturbed to a disturbed quality. Alternative D would protect the most acres in Visual Resource Management Classes II and III and protect the fewest in Class IV. Alternatives B and C would protect the fewest (a similar amount) of acres in Classes II and III and place the most acres in Class IV. These effects largely describe management objectives. Economic values would only be affected when actual changes in the quality of the aesthetic landscape occurred.

Cultural Meaning

While the Cultural and Paleontological Resources section of this document analyzed the potential of each alternative to adversely affect cultural resources, the great majority of potential adverse impacts would be prevented through pre-disturbance surveys. In general, however, alternatives A and D are the least likely to result in potential adverse impacts to cultural and paleontological resources because they allow for the type of ground disturbing activity most likely to disturb cultural and paleontological resources on the least amount of acres within the decision area. Alternatives B and C would have a greater potential adverse impacts. Such impacts could potentially reduce the supply or quality of cultural resources, and possibly harm resources that people and societies hold important and would prefer to protect their continued existence. Pre-disturbance surveys and subsequent protection of sites would protect the economic values that people and societies place on these resources.

In addition to disturbing cultural resources, the alternatives would also affect levels of culturally important biological resources, as discussed above in Special Forest Products and Biodiversity and Sensitive Species. As the alternatives would reduce the supply of these resources, impacting the well-being of people who hold them important, whether or not they interact directly with them, via harvest, viewing, or other purposes. As described above, the alternatives would affect each type of biological resource differently. A particular alternative has the potential to reduce the supply of some cultural resources while at the same time increasing the supply of others. These effects would have varying impacts on individuals' experience of sense of place, spiritual enrichment, and cognitive development. At the broad landscape scale of this analysis, it is not possible to determine or estimate with meaningful accuracy the overall effects on the value of cultural meaning under the different alternatives.

Summary

Table 3-173 summarizes the effects of the alternatives and on the value of goods and services that BLM-administered lands in western Oregon supply. It shows the market and non-market values in 2012. For goods and services where effects are monetizable (e.g., timber), the table shows the monetary value of the good or service over the period of analysis associated with each alternative. For goods and services where data limited the analysis of the monetary value of the effect, the table shows the expected direction of change in value for each alternative.

Table 3-173. Table summary of effects on economic value of goods and services derived from BLM-administered lands in Western Oregon.

Good/Service	Type of Valuation	Economic Value in 2012	Impact by Alternative				
			No Action	Alt. A	Alt. B	Alt. C	Alt. D
Biodiversity and Sensitive Species	Qualitative	Not Monetized	-	Lower valueless increase associated with less increase in structurally-complex forest.	Higher increase associated with more increase in structurally-complex forest.	Less increase associated with less increase in structurally-complex forest.	Higher increase associated with more increase in structurally-complex forest.
			-	Diminished economic well-being associated with less butterfly habitat. Economic values associated with species generally protected or enhanced in the long run.			
Carbon Storage	Non-Market ($ millions)	$99	$131.4	$179.3	$165.0	$54.6	$232.8
			Average per year 2013 - 2022				
Cultural Meaning	Qualitative	Not Monetized	Value of cultural sites and artifacts protected across all alternatives. Overall effect on cultural meaning impossible to assess at the present scale of analysis.				
Energy Production	Market	$0.032 million	Value of energy production across all alternatives limited by lack of demand. Supply of biomass would increase; Supply of land available for wind/ROW development would decrease.				
Grazing	Market	$0.022 million	No change in supply or value of grazing.				No grazing would reduce value to $0.
Minerals	Market	$0.015 million	Small change in acres available for quarry development would not likely be large enough to change quantity or value of minerals produced. No change in value of locatable or leasable minerals.				
Recreation	Non-Market ($ millions)	$222.8	$250.1 (Consistent under all alternatives)				
Scenic Amenities	Qualitative	Not Monetized	Potential 77% reduction in VRI Class II could reduce value of aesthetic resources	Potential 75% reduction in VRI Class II could reduce value of aesthetic resources	Potential 82% reduction in VRI Class II could reduce value of aesthetic resources	Potential 82% reduction in VRI Class II could reduce value of aesthetic resources	Potential 90% reduction in VRI Class II could reduce value of aesthetic resources
Source Water Protection	Qualitative	Not Monetized	No change under any alternative.				
Special Forest Products	Market	BLM Revenue: $0.2 million; Market Value Low $0.4 million, High $6.5 million	Changes in supply of lands suitable for the production of Category 1 and Category 2 species produce relatively small changes and would likely have a small effect on the overall supply, and thus the value, of each category of special forest product in the planning area.				
Timber	Market ($ millions)	$20.8	$93.0	$56.2	$72.9	$134.9	$37.4
			Average per year 2013 - 2022				

Issue 2

How would the alternatives affect economic activity in the planning area derived from BLM-administered lands?

Summary of Analytical Methods

The BLM developed two sets of economic models to portray economic conditions in the planning area and to estimate the contributions or effects of BLM management. The first set included seven multi-county models organized around BLM districts to estimate the effects of BLM resource programs and expenditures. The BLM delineated all district model areas, which often cover multiple counties, based on the economic connections to resource processing, visitor spending, and agency expenditures rather than on the acreage of BLM-administered land. Except for the Salem District, a single model represents each district. The Salem District covers a very large and economically diverse portion of northwestern Oregon, and therefore required two distinct models to separate economic effects occurring in the urban Portland area from those occurring in more rural areas (i.e., the counties either inside or outside the Portland Metropolitan Statistical Area (MSA), OMB 2013). District model areas include the following counties:

- Coos Bay — Coos, Curry
- Eugene — Lane
- Klamath Falls — Klamath
- Medford — Jackson, Josephine
- Roseburg — Douglas
- Salem-Other — Benton, Clatsop, Lincoln, Linn, Marion, Polk, Tillamook
- Salem-Portland MSA — Clackamas, Columbia, Multnomah, Washington, Yamhill

The second set of model areas aligns with individual counties to capture best the local effects triggered by local government spending of Federal payments. Both sets of models covered the entire planning area. Planning area effects are the sum of either BLM district models and/or individual county models that cover the same geographic area. All models built and run for the analysis utilized the IMPLAN® modeling system (MIG, Inc. 2014), which include proprietary data sets. Employment and earnings results from both sets of models includes the sum of all direct effects triggered by spending or production, plus supply chain (indirect) effects in supporting industries and other (induced) effects from industry employees spending payrolls.

Public and private data for 2012, the most recent year for which all economic data were available, provided the foundation for all economic models. In addition to proprietary IMPLAN® data sets, the district models use public and private forest and wood products industries data provided by the Oregon Forest Resources Institute (OFRI 2012). The BLM customized both the district and county models with State and local government employment data publically available from the Oregon Employment Department (OED 2014). All models included information on employment, earnings, production levels, organizational spending, and prices.

For the purposes of this analysis, the BLM defined employment as the average number of full-time and part-time jobs reported monthly over an entire year. Earnings includes total payroll cost of employees, including such payments as wages, salaries, bonuses, health insurance and other benefits, retirement contributions, and payroll taxes. Given lags in data availability, jobs, and earnings in 2012 (expressed in 2012 dollars) represent current conditions in the planning area.

The BLM's management of public lands triggers economic effects in three ways: output production from resource management programs, agency expenditures, and Federal payments to local governments. Program outputs include timber harvest, special forest products, recreation (including wildlife and fish-based), minerals, and grazing. Program expenditures include all operational expenses (personnel, facilities, and overhead) plus resource-specific expenses to accomplish such activities as watershed restoration, fuels reduction, and transportation management. Federal payments include all funds received by counties, such as payments in lieu of taxes (PILT), mineral royalties, and O&C payments or their replacement (i.e., payments authorized by the Secure Rural Schools and Community Self-Determination Act, as amended).

The BLM estimated economic contributions from resource outputs based on the availability of both BLM records and either production or spending data. BLM records and research data abound for timber, forage, minerals, and recreation use of public lands. BLM data are insufficient at this time to make economic contribution estimates for most non-timber special forest products, but are available for timber special forest products. Although the BLM collects information on permits for non-timber special forest products, sufficient data on quantities and values are not available. Research and agency reporting continue to improve in efforts to close these data gaps. Records of BLM agency expenditures and of Federal payments to local governments provided a sound basis for estimating the local contributions triggered by Federal and local government spending.

The BLM provided resource program outputs and agency expenditures for the models. The Oregon Department of Forestry and USDA-Forest Service (Gale *et al.* 2012, ODF 2014, Zhou 2013) provided geographic data on 2012 harvest and processing locations that yielded log flows for the analysis. The Department of the Interior (USDI 2014) and the Association of O&C Counties (AOC 2014) provided data on Federal payments. Each O&C county, through the cooperation of the Association of O&C Counties (AOC 2014), provided representative spending patterns of Federal payments. The Forest Service (White 2014, USDA FS 2014) provided spending patterns by recreationists on BLM-managed lands.

The economic effects described in the section reflect the effects of Federal payments to counties, as they would be under the formula established in the O&C Act. This is because of the uncertainty over the future of payments under the Secure Rural Schools (SRS) and Self-Determination Act (see discussion in Issue 3, County Payments).

In addition to comparing the projected impacts of alternatives in 2018, the effects tables also display current conditions as of 2012. To facilitate a comparison between current conditions and 2018 on an equal basis, for the effects analysis the BLM modified the effects of the actual payments to counties in 2012 (as shown in the affected environment section) to reflect the effects of the payments as they would have been under the O&C Act. The relevant columns in the environmental effects tables are labeled "Current Modified." For example, in 2012, the actual effect of all BLM-based Federal payments was 699 jobs (**Table 3-183**). The modified current effect would have been 198 jobs (**Table 3-184**).

The BLM assumed, for purposes of this part of the analysis, that the State forecasts capture the effects of BLM management under the No Action alternative (i.e., the 1995 RMPs as written).

The timber program shows anticipated effects of BLM timber harvested and processed in western Oregon. The total effects of each alternative include all direct employment and earnings in the forest products industry plus supply chain (indirect) effects in supporting industries and other (induced) effects from industry payrolls.

This issue presents an analysis of direct and indirect effects of implementation of the alternatives on economic activity in the planning area. This issue also presents an analysis of the cumulative effects on economic activity of past, present, and reasonably foreseeable future actions, including both land management on BLM-administered lands and non-BLM-administered lands, presenting the effects of the alternatives in relation to the broader economic context in western Oregon.

The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014, pp. 135-137).

Affected Environment

Area Employment and Earnings

The Analysis of the Management Situation (AMS) for the RMPs for Western Oregon summarizes historic and trend data for employment, unemployment, and earnings in the planning area, (USDI BLM 2013, pp. 104-108). When the BLM published the AMS, the most recent year available for these data was 2011. Data for 2012 are now available and used throughout this section to represent current conditions. **Table 3-174** shows current total employment and earnings for each of the model areas. Appendix O includes tables with employment and earnings by industry.

Table 3-174. Employment and earnings by district model area, 2012 (jobs, millions of 2012$).

Industry	District Model Area Name and Counties							Planning Area Totals	Oregon Totals
	Coos Bay	Eugene	Klamath Falls	Medford	Roseburg	Salem-Other	Salem-Portland MSA		
	Coos, Curry	Lane	Klamath	Jackson, Josephine	Douglas	Benton, Clatsop, Lincoln, Linn, Marion, Polk, Tillamook	Clackamas, Columbia, Multnomah, Washington, Yamhill		
Employment (Jobs)	40,276	186,049	31,881	145,525	46,527	359,408	1,147,490	1,957,157	2,221,563
Earnings (Millions of 2012$)	$1,507.7	$7,733.7	$1,198.0	$5,604.1	$1,789.7	$15,111.7	$65,067.0	$98,012.0	$108,412.3

Sources: MIG, Inc. 2013; Oregon Forest Resources Institute 2012 (forest products industries within greater Agriculture and Manufacturing throughout planning area).

Since 2001, total employment in the planning area has grown by 7.2 percent. However, since 2007, which was the peak of economic activity before the 2007 to 2009 recession, employment is down by 3.3 percent. Generally, throughout the planning area, district model areas show positive employment growth since 2001 ranging from 2.7 percent in the Coos Bay area to 9.8 percent in the Salem-Portland MSA area. Klamath Falls (-2.7 percent) and Roseburg (-3.9 percent) are still down from their 2001 levels. All model areas are down from their peak in 2007, ranging from the deepest low in Roseburg (-10.7 percent) to a very modest low in Salem-Portland MSA (-0.1 percent).

The two Salem District model areas account for 1.5 million jobs, or two-thirds of all employment in the planning area. At 1.1 million jobs in the Salem-Portland MSA model area and 0.4 million in the Salem-Other (non-MSA counties) area, these two are the largest economies in the planning area. The largest two industries in the two Salem District model areas, Health and Social Services and Governments, supply 238,000 jobs, or 21 percent of total employment in the Salem-Portland MSA area, and 112,000 jobs, or 31 percent in non-MSA counties. The next largest industries, Retail Trade and Manufacturing, each provide over 100,000 jobs or nine percent in the Salem-Portland MSA area. In non-MSA counties, these same two industries account for nearly 38,000 jobs (11 percent) and 26,000 jobs (7 percent), respectively. Manufacturing, Governments, Health and Social Services, and Professional Services account for 48 percent ($31 billion) of all earnings within the Portland-MSA. Among the non-MSA counties, Governments, Health and Social Services, Manufacturing, and Retail Trade tally over $8.5 billion, or 55 percent, of all earnings. Total payrolls in these two model areas provide over 80 percent of all earnings in the planning area.

The five BLM District model areas from Eugene south have a pattern that is similar to the non-MSA counties within the Salem District. The top four sectors for employment are Governments, Health and Social Services, and Retail Trade followed by Manufacturing. Only in the Klamath Falls model area does a different industry—Agriculture rather than Manufacturing—make it into the top four. Earnings follow the employment pattern in all five model areas. Earnings by public sector employees lead in all areas except Eugene, where Health and Social Services payrolls are the largest in the area and exceed government payrolls by two percent. Retail Trade exhibits the lowest earnings of the top four industries, except in the Medford area where Manufacturing trails Retail Trade.

The recreation industry is well-represented throughout western Oregon. While recreation participants spend money in many retail and service sectors, the BLM uses only two sectors in this analysis as an indicator of the visitor services or recreation industry: Arts, Entertainment, and Recreation Services, and Accommodation and Food Services. These two sectors are especially aligned with both visitors from out of the area (e.g. accommodations) as well as local residents who engage in recreation (e.g., recreation services, food services). These two sectors account for over 187,000 jobs (10 percent) and $4.1 billion of earnings (4 percent) throughout the planning area. The two Salem District model areas supply three-quarters of all jobs and 80 percent of all payrolls in these sectors within the planning area. In the central and southern model areas, Medford and Eugene stand out with over 16,000 jobs each (9 percent and 11 percent, respectively) and from $300 to $342 million in payrolls (4 percent and 5 percent, respectively).

Since 2001, visitor service or recreation industry employment in the planning area has grown by 19.8 percent. Since 2007, planning area employment in this industry is up by 2.4 percent. Generally, throughout the planning area, district model areas show positive growth since 2001 ranging from 9.0 percent in the Coos Bay area to 26.5 percent in the Salem-Portland MSA area. Two areas are still down from their 2001 levels - Klamath Falls (-3.3 percent) and Roseburg (-2.8 percent). All model areas but one are down from their peak in 2007, ranging from the deepest low in Klamath Falls (-14.8 percent) to a very modest low in Eugene (-0.2 percent). The sole model area with growth in this industry is Salem-Portland MSA with 6.8 percent.

The forest products industry is important throughout the planning area and of particular interest for public land resource management in western Oregon. **Tables 3-175** and **3-176** provide employment and earnings information for detailed sectors within the larger forest products industry. In both of the Salem model areas, Support Activities for Agriculture and Forestry is the largest employer within the forest products industry. This detailed sector includes private firms that provide services such as estimating timber, fighting forest fires, controlling forest pests, and planting seedlings for reforestation. It also includes firms that support agricultural production through planting crops, cultivating services, and vineyard cultivation. Firms that provide only forestry support could not be statistically separated from those that provide agricultural support. As a whole, this sector provides nearly 11,000 jobs (0.7 percent) and $295 million in earnings (0.4 percent) across both model areas.

The forest products industry in the non-MSA counties of the Salem District includes all types of wood fiber harvesting and processing. In terms of employment, the industry supplies over 24,000 jobs with payrolls exceeding $1.3 billion (about two percent of total jobs and earnings). In the areas south of the Salem District, Forestry & Logging, Sawmills & Wood Preservation, and Veneer, Plywood, Reconstituted, and Engineered Wood Products are the three major elements of the forest products industry. In addition, the Eugene area has several firms that manufacture pulp and paper products. Total forest products industry employment ranges from a low of about 2,000 in the Klamath Falls area (6 percent of area total) to a high of 5,300 in the Eugene area (3 percent of area total). Similarly, earnings range from $151 million in the Klamath Falls area (13 percent of area total) to a high of $368 million in the Eugene area (5 percent of area total).

Table 3-175. Forest products industry employment by detailed sector by district model area, 2012 (jobs).

Detailed Sector North American Industry Classification System (NAICS)		District Model Area Name and Counties							Planning Area Totals
		Coos Bay	Eugene	Klamath Falls	Medford	Roseburg	Salem-Other	Salem-Portland MSA	
Description	**Code**	**Coos, Curry**	**Lane**	**Klamath**	**Jackson, Josephine**	**Douglas**	**Benton, Clatsop, Lincoln, Linn, Marion, Polk, Tillamook**	**Clackamas, Columbia, Multnomah, Washington, Yamhill**	
Forestry and Logging	113	965	1,000	361	632	1,021	2,283	1,917	8,292
Support Activities for Agriculture and Forestry	115	625	683	255	1,548	334	6,180	4,481	14,106
Wood Products Manufacturing	321	1,112	3,251	1,363	1,863	2,578	2,502	2,869	15,538
Sawmills and Wood Preservation	3211	432	1,120	D	100	863	1,105	1,007	D
Veneer, Plywood, Reconstituted, and Engineered Wood Products	3212	583	1,510	D	903	1,127	290	54	D
Other Wood Products	3219	97	621	D	860	588	1,107	1,808	D
Paper Manufacturing	322	-	403	-	25	-	2,385	1,720	4,533
Pulp, Paper, and Paperboard Mills	3221	-	383	-	-	-	1,843	845	3,071
Converted Paper Products Manufacturing	3222	-	20	-	25	-	542	875	1,462
	Totals	**2,702**	**5,337**	**1,979**	**4,068**	**3,933**	**5,337**	**10,987**	**42,469**

Sources: Oregon Forest Resources Institute 2012. MIG, Inc. 2013 (NAICS 115 only).
D = Disclosure restricted because of confidentiality.
Table does not include trucking of logs and lumber because it is 1) not identifiable by NAICS and 2) less than 14 percent of the entire trucking industry (OFRI 2012; IMPLAN 2013).

Table 3-176. Forest products industry earnings by detailed sector by district model area, 2012 (millions of 2012$).

Detailed Sector North American Industry Classification System (NAICS)		District Model Area Name and Counties							Planning Area Totals
		Coos Bay	Eugene	Klamath Falls	Medford	Roseburg	Salem-Other	Salem-Portland MSA	
Description	**Code**	**Coos, Curry**	**Lane**	**Klamath**	**Jackson, Josephine**	**Douglas**	**Benton, Clatsop, Lincoln, Linn, Marion, Polk, Tillamook**	**Clackamas, Columbia, Multnomah, Washington, Yamhill**	
Forestry and Logging	113	$64.9	$79.8	$33.0	$52.5	$54.2	$212.4	$157.6	$654.4
Support Activities for Agriculture and Forestry	115	$11.0	$18.5	$9.7	$48.0	$10.1	$162.1	$132.6	$392.0
Wood Products Manufacturing	321	$76.1	$221.5	$108.2	$108.2	$169.9	$153.2	$154.1	$991.1
Sawmills and Wood Preservation	3211	$27.3	$82.4	D	$6.2	$61.9	$71.8	$52.9	D
Veneer, Plywood, Reconstituted, and Engineered Wood Products	3212	$44.6	$118.4	D	$77.2	$97.1	$44.2	$18.7	D
Other Wood Products	3219	$4.2	$20.7	D	$24.8	$10.9	$37.3	$82.5	D
Paper Manufacturing	322	-	$48.5	-	$2.2	-	$239.4	$136.5	$426.7
Pulp, Paper, and Paperboard Mills	3221	-	$47.4	-	-	-	$197.9	$74.3	$319.6
Converted Paper Products Manufacturing	3222	-	$1.2	-	$2.2	-	$41.5	$62.2	$107.1
	Totals	**$152**	**$368**	**$151**	**$211**	**$234**	**$767**	**$152**	**$2,464**

Sources: Oregon Forest Resources Institute 2012; MIG, Inc. 2013 (NAICS 115 only).
D = Disclosure restricted because of confidentiality.
Table does not include trucking of logs and lumber because it is 1) not identifiable by NAICS and 2) less than 14 percent of the entire trucking industry (OFRI 2012; IMPLAN 2013).

Table 3-177, below, displays the share of employment and earnings by both timber-related and recreation-related industries to total employment and earnings in each BLM district model area. One or both of these industries are particularly important to four model areas: Roseburg, Coos Bay, Medford, and Klamath Falls. The recreation-related industry is strongest in Coos Bay and Medford where employment sums to 11 percent of area jobs and payrolls sum to over 5 percent of area earnings. The timber-related industry is most robust in Roseburg, Coos Bay, and Klamath Falls, where employment ranges from 6.2 to 8.5 percent of all area jobs and payrolls range from 10.1 to 13.1 percent of all earnings.

A shrinking of the wood products manufacturing industry has been evident in the planning area since 2001, the industry contracted by -39.3 percent between 2001 and 2012. Since 2007, when many Oregon industries were at peak employment, planning area employment in this industry is down by -31.8 percent. All district model areas show negative growth since 2001 ranging from -43.9 percent in the Salem-Other area to -16.5 percent in the Coos Bay area. All areas except Coos Bay show negative growth at greater than -30 percent. No model area experienced a peak of industry employment in 2007. Statewide, employment in this industry is down by -33.6 percent since 2007 and -40.8 percent since 2001.

Table 3-177. Employment and earnings in timber- and recreation-related industries as a share of total employment and earnings by district model area, 2012.

Resource-Related Industry		District Model Area Name and Counties							Planning Area Totals
		Coos Bay	Eugene	Klamath Falls	Medford	Roseburg	Salem-Other	Salem-Portland MSA	
		Coos, Curry	Lane	Klamath	Jackson, Josephine	Douglas	Benton, Clatsop, Lincoln, Linn, Marion, Polk, Tillamook	Clackamas, Columbia, Multnomah, Washington, Yamhill	
Employment	Timber-Related[1] (Forest Products)	6.7%	2.9%	6.2%	2.8%	8.5%	3.7%	1.0%	2.2%
	Recreation-Related[3] (Arts, entertainment, and recreation; Accommodations and Food Services)	11.0%	9.4%	10.0%	11.1%	7.9%	9.9%	9.3%	9.6%
Earnings	Timber-Related[2] (Forest Products)	10.1%	4.8%	12.6%	3.8%	13.1%	5.1%	0.9%	2.5%
	Recreation-Related[3] (Arts, entertainment, and recreation; Accommodations and Food Services)	5.5%	4.4%	4.5%	5.3%	4.0%	4.5%	4.0%	4.2%

[1] Percentages calculated by dividing total employment in **Table 3-175** for each geographic area by total employment in **Table 3-174** for the same geographic area.
[2] Percentages calculated by dividing total earnings in **Table 3-175** for each geographic area by total earnings in **Table 3-174** for the same geographic area.
[3] Percentages calculated by dividing recreation-related industry total for each geographic area (selected geographic areas in text, others in project record) by comparable total in **Table 3-174** for the same geographic area.

There are large differences between compensation for timber-related jobs compared to recreation-related jobs in western Oregon. The average forest products industry job-holder earns approximately $58,000 while the average recreation-based employee earns approximately $22,000, roughly a third of timber-related industries (**Table 3-176** and tables in Appendix O). Note that recreation includes two industries; Arts, Entertainment and Recreation Services, and Accommodation and Food Services).

Contributions by BLM Management to Local Economies

Through its management of Oregon & California (O&C), Coos Bay Wagon Road (CBWR), and other public lands, the BLM contributes economically to all parts of the planning area, triggered by:

- The production and use of basic commodities, such as timber, forage, minerals, and other forest products derived from BLM-administered lands
- Personal and commercial use of BLM-administered lands, such as for recreation, solitude, education, and reflection
- Local agency expenditures for personnel, materials, and services; and
- Federal payments to state and local governments, such as payments made under the Secure Rural Schools and Community Self-Determination Act and Payments in Lieu of Taxes Act, that are also spent on personnel, materials, and services.

The presentation of BLM contributions differs from the preceding presentation of area industry totals in **Tables 3-173** through **3-177**. **Tables 3-178** through **3-183** illustrate the various dimensions of BLM contributions in 2012, including the sum of direct, indirect, and induced effects the BLM contributions trigger as they ripple throughout each model area. Direct effects are those in industries either processing BLM resource outputs (e.g., sawmills) or selling goods and services to public land users (e.g., outfitter and guide services) and to government agencies using Federal funds (e.g., office supplies). Indirect effects are those in local supply chains that support local firms producing direct goods and services. Finally, induced effects are those triggered by workers in either direct or indirect firms who spend a portion of their paycheck locally. Thus, the BLM contributions trigger effects that find their way into virtually every industry of the local economy.

Table 3-178. Employment and earnings contribution of BLM programs to district model areas, 2012.

Program		District Model Area Name and Counties							Planning Area Totals
		Coos Bay	**Eugene**	**Klamath Falls**	**Medford**	**Roseburg**	**Salem-Other**	**Salem-Portland MSA**	
		Coos, Curry	**Lane**	**Klamath**	**Jackson, Josephine**	**Douglas**	**Benton, Clatsop, Lincoln, Linn, Marion, Polk, Tillamook**	**Clackamas, Columbia, Multnomah, Washington, Yamhill**	
Employment (Jobs)	Recreation	276	527	60	425	507	133	854	2782
	Grazing	-	-	55	40	-	-	-	95
	Timber	710	480	40	340	488	432	407	2,897
	Minerals	-	3	-	1	2	-	-	6
	Agency Expenditures	192	259	71	454	176	271	-	1423
	Payments to States/Counties	70	93	19	236	189	55	36	699
	Totals	**1,249**	**1,363**	**245**	**1,496**	**1,362**	**891**	**1,297**	**7,904**
	Share of Total Employment in Area[1]	3.1%	0.7%	0.8%	1.0%	2.9%	0.2%	0.1%	0.4%
Earnings (Millions of 2012 Dollars)	Recreation	$7.0	$16.2	$1.6	$12.2	$13.6	$3.8	$32.8	$87.2
	Grazing	-	-	$0.8	$0.6	-	-	-	$1.4
	Timber	$33.3	$23.2	$1.9	$15.8	$23.5	$21.3	$22.8	$141.7
	Minerals	-	$0.2	-	<$0.1	$0.1	-	-	$0.3
	Agency Expenditures	$13.1	$15.2	$4.2	$27.2	$12.0	$17.4	-	$89.1
	Payments to States/Counties	$3.4	$5.9	$0.9	$10.2	$9.6	$3.3	$2.2	$35.5
	Totals	**$56.8**	**$45.9**	**$60.7**	**$58.9**	**$9.4**	**$66.0**	**$57.8**	**$355.3**
	Share of Total Earnings in Area[2]	3.8%	0.3%	0.8%	3.3%	0.8%	1.2%	0.1%	0.4%

Note: Totals may not add due to rounding.

[1] Percentages calculated by dividing total employment in this table for each geographic area by total employment in **Table 3-174** for the same geographic area.

[2] Percentages calculated by dividing total earnings in this table for each geographic area by total earnings in **Table 3-174** for the same geographic area.

Table 3-179. Employment contribution of BLM timber programs to forest products industry by district model area, 2012 (jobs).

Detailed Sector North American Industry Classification System (NAICS)		District Model Area Name and Counties							Planning Area Totals
		Coos Bay	Eugene	Klamath Falls	Medford	Roseburg	Salem-Other	Salem-Portland MSA	
Description	**Code**	**Coos**	**Lane**	**Klamath**	**Jackson, Josephine**	**Douglas**	**Benton, Clatsop, Lincoln, Linn, Marion, Polk, Tillamook**	**Clackamas, Columbia, Multnomah, Washington, Yamhill**	
Forestry and Logging	113	140	71	9	48	88	78	43	477
Support Activities for Agriculture and Forestry	115	93	47	6	32	59	47	34	317
Wood Products Manufacturing	321	131	81	6	59	133	56	51	518
Sawmills and Wood Preservation	3211	111	56	4	40	72	50	46	379
Veneer, Plywood, Reconstituted, and Engineered Wood Products	3212	20	20	1	6	10	5	4	66
Other Wood Products	3219	<1	5	1	13	51	1	2	73
Paper Manufacturing	322	<1	13	<1	<1	<1	15	13	41
Pulp, Paper, and Paperboard Mills	3221	<1	13	<1	<1	<1	15	13	41
Converted Paper Products Manufacturing	3222	-	<1	-	<1	-	<1	<1	<1
Totals		**363**	**212**	**21**	**139**	**280**	**196**	**142**	**1,354**
Share of Forest Products Industry in Area[1]		13.4%	4.0%	1.0%	3.4%	7.1%	1.5%	1.3%	3.2%
Share of Total Employment in Area[2]		0.9%	0.1%	0.1%	0.1%	0.6%	0.1%	<0.1%	0.1%

Note: Totals may not add due to rounding.
[1] Percentages calculated by dividing total employment in this table for each geographic area by total employment in **Table 3-175** for the same geographic area.
[2] Percentages calculated by dividing total employment in this table for each geographic area by total employment in **Table 3-174** for the same geographic area.

Table 3-180. Earnings contribution of BLM timber programs to forest products industry by district model area, 2012 (millions of 2012$).

Detailed Sector North American Industry Classification System (NAICS)		District Model Area Name and Counties							Planning Area Totals
		Coos Bay	Eugene	Klamath Falls	Medford	Roseburg	Salem-Other	Salem-Portland MSA	
Description	**Code**	**Coos, Curry**	**Lane**	**Klamath**	**Jackson, Josephine**	**Douglas**	**Benton, Clatsop, Lincoln, Linn, Marion, Polk, Tillamook**	**Clackamas, Columbia, Multnomah, Washington, Yamhill**	
Forestry and Logging	113	$9.8	$4.9	$0.6	$3.4	$6.2	$5.5	$3.1	$33.5
Support Activities for Agriculture and Forestry	115	$3.7	$1.9	$0.2	$1.3	$2.4	$1.9	$1.4	$12.7
Wood Products Manufacturing	321	$7.3	$4.5	$0.3	$3.3	$7.4	$3.1	$2.8	$28.7
Sawmills and Wood Preservation	3211	$6.1	$3.1	$0.2	$2.2	$4.0	$2.8	$2.5	$20.8
Veneer, Plywood, Reconstituted, and Engineered Wood Products	3212	$1.1	$1.1	-	$0.4	$0.6	$0.3	$0.2	$3.8
Other Wood Products	3219	<$0.1	$0.3	$0.1	$0.7	$2.9	$0.1	$0.1	$4.1
Paper Manufacturing	322	<$0.1	$1.2	<$0.1	<$0.1	<$0.1	$1.3	$1.2	$3.8
Pulp, Paper, and Paperboard Mills	3221	<$0.1	$1.2	<$0.1	<$0.1	<$0.1	$1.3	$1.2	$3.8
Converted Paper Products Manufacturing	3222	-	<$0.1	-	<$0.1	-	<$0.1	<$0.1	<$0.1
Totals		**$20.8**	**$12.5**	**$1.2**	**$7.9**	**$16.0**	**$11.8**	**$1.2**	**$78.7**
Share of Forest Products Industry in Area[1]		13.7%	3.4%	0.8%	3.8%	6.8%	1.5%	0.8%	3.2%
Share of Total Employment in Area[2]		1.4%	0.2%	0.1%	0.1%	0.9%	0.1%	0.1%	0.1%

Note: Totals may not add due to rounding.

[1] Percentages calculated by dividing total earnings in this table for each geographic area by total earnings in **Table 3-176** for the same geographic area.

[2] Percentages calculated by dividing total earnings in this table for each geographic area by total earnings in **Table 3-174** for the same geographic area.

Table 3-181. Employment and earnings contribution of BLM recreation programs to recreation-related industries by district model area, 2012.

Industry		District Model Area Name and Counties							Planning Area Totals
		Coos Bay	Eugene	Klamath Falls	Medford	Roseburg	Salem-Other	Salem-Portland MSA	
		Coos	Lane	Klamath	Jackson, Josephine	Douglas	Benton, Clatsop, Lincoln, Linn, Marion, Polk, Tillamook	Clackamas, Columbia, Multnomah, Washington, Yamhill	
Employment (Jobs, Percent)	Arts, Entertainment, and Recreation Services	72	87	12	81	92	38	115	498
	Accommodation and Food Services	135	225	29	165	201	72	340	1,167
	Totals	**206**	**312**	**41**	**245**	**293**	**111**	**455**	**1,664**
	Share of Recreation-related Industry in Area[1]	4.6%	1.8%	1.3%	1.5%	8.0%	0.3%	0.4%	0.9%
	Share of Total Employment in Area[2]	0.5%	0.2%	0.1%	0.2%	0.6%	<0.1%	<0.1%	0.1%
Earnings (Millions of 2012$, Percent)	Arts, Entertainment, and Recreation Services	$1.6	$2.6	$0.3	$2.0	$2.5	$1.3	$3.6	$13.9
	Accommodation and Food Services	$2.8	$4.8	$0.6	$3.4	$4.1	$1.5	$9.1	$26.3
	Totals	**$4.4**	**$7.5**	**$0.8**	**$5.4**	**$6.6**	**$2.8**	**$12.7**	**$40.2**
	Share of Recreation-related Industry in Area[1]	5.3%	2.2%	1.6%	1.8%	9.3%	0.4%	0.5%	1.0%
	Share of Total Employment in Area[2]	0.3%	0.1%	0.1%	0.1%	0.4%	<0.1%	<0.1%	<0.1%

Note: Totals may not add due to rounding.

[1] Percentages calculated by dividing table total for each geographic area by recreation-related industry total for the same geographic area (selected geographic areas in text, others in project record).

[2] Percentages calculated by dividing table total for each geographic area by comparable total employment or total earnings in **Table 3-174** for the same geographic area.

Table 3-182. Employment and earnings in O&C counties generated by BLM-based Federal payments, 2012 (jobs, millions of 2012$).

County	Secure Rural Schools Program[1]							
	Title I and III				Title II		Total	
	County Government		Private Sector		Private Sector		County-wide	
	Jobs	Earnings	Jobs	Earnings	Jobs	Earnings	Jobs	Earnings
Benton	6	$0.5	3	$0.1	1	$0.1	10	$0.6
Clackamas	8	$0.7	5	$0.2	3	$0.1	15	$0.9
Columbia	6	$0.5	2	$0.1	2	<$0.1	10	$0.6
Coos	31	$1.6	9	$0.3	4	$0.1	44	$2.1
Curry	15	$0.9	5	$0.1	3	$0.1	23	$1.1
Douglas	133	$7.4	41	$1.4	12	$0.7	185	$9.4
Jackson	86	$3.1	30	$1.1	26	$0.8	141	$4.9
Josephine	56	$4.0	24	$0.8	11	$0.4	91	$5.2
Klamath	11	$0.6	5	$0.2	2	$0.1	17	$0.8
Lane	50	$4.4	29	$1.0	14	$0.4	92	$5.8
Lincoln	1	$0.1	1	<$0.1	-	<$0.1	2	$0.1
Linn	11	$0.9	4	$0.1	2	$0.1	17	$1.1
Marion	4	$0.3	2	$0.1	1	<$0.1	8	$0.5
Multnomah	2	$0.1	1	$0.1	1	<$0.1	4	$0.2
Polk	7	$0.5	2	$0.1	2	$0.1	12	$0.7
Tillamook	2	$0.2	1	<$0.1	1	<$0.1	4	$0.2
Washington	1	$0.1	1	<$0.1	1	<$0.1	2	$0.1
Yamhill	3	$0.2	1	<$0.1	-	<$0.1	4	$0.2
Totals	**434**	**$26.1**	**163**	**$5.6**	**85**	**$3.0**	**682**	**$34.8**

[1] Based upon Secure Rural Schools program payments received and spent by local governments in calendar year 2012.
Note: Clatsop County is not included on the table. Included within the larger economic analysis area, Clatsop County has a small amount of BLM-administered lands, but does not have O&C or CBWR lands. Consequently, BLM-based Federal payments to Clatsop County are very small and generate a positive, but very minor effect on the county economy.

Table 3-183. Employment and earnings in O&C counties generated by BLM-based Federal payments, 2012 (jobs, millions of 2012$).

County	PILT Program[1] (BLM Acreage Only)						All BLM-based Federal Payments			
	County Government		Private Sector		County-wide		County-wide Jobs		County-wide Earnings	
	Jobs	Earnings	Jobs	Earnings	Jobs	Earnings	Total	Share of County Total[2]	Total	Share of County Total[2]
Benton	-	-	-	-	-	-	10	<0.1%	$0.6	<0.1%
Clackamas	-	-	-	-	-	-	16	<0.1%	$0.9	<0.1%
Columbia	-	-	-	-	-	-	10	0.1%	$0.6	0.1%
Coos	2	$0.1	1	-	3	$0.1	47	0.2%	$2.2	0.2%
Curry	-	-	-	-	-	-	24	0.2%	$1.2	0.3%
Douglas	3	$0.2	1	-	4	$0.2	189	0.4%	$9.6	0.5%
Jackson	3	$0.1	1	-	4	$0.1	145	0.1%	$5.0	0.1%
Josephine	-	-	-	-	-	-	91	0.3%	$5.2	0.4%
Klamath	1	$0.1	-	-	2	$0.1	19	0.1%	$0.9	0.1%
Lane	1	$0.1	1	-	2	$0.1	93	0.1%	$5.9	0.1%
Lincoln	-	-	-	-	-	-	2	<0.1%	$0.1	<0.1%
Linn	-	-	-	-	-	-	18	<0.1%	$1.1	0.1%
Marion	-	-	-	-	-	-	8	<0.1%	$0.5	<0.1%
Multnomah	-	-	-	-	-	-	4	<0.1%	$0.2	<0.1%
Polk	1	$0.1	-	-	1	$0.1	13	0.1%	$0.7	0.1%
Tillamook	-	-	-	-	-	-	4	<0.1%	$0.2	0.1%
Washington	-	-	-	-	-	-	3	<0.1%	$0.2	<0.1%
Yamhill	-	-	-	-	-	-	4	<0.1%	$0.2	<0.1%
Totals	**13**	**$0.7**	**5**	**$0.2**	**17**	**$0.9**	**699**	**<0.1%**	**$35.7**	**<0.1%**

[1] Based upon Payments in Lieu of Taxes program payments received and spent by local governments in calendar year 2012.
Note: Clatsop County is not included on the table. Included within the larger economic analysis area, Clatsop County has a small amount of BLM-administered lands, but does not have O&C or CBWR lands. Consequently, BLM-based Federal payments to Clatsop County are very small and generate a positive, but very minor effect on the county economy.
[2] Percentages calculated by dividing table total for each county by comparable total employment or total earnings for the same county (provided in project record).

Economic contributions of BLM programs and payments total 7,900 jobs and over $350 million of earnings across the entire planning area. Total employment contributions range from a low of 240 jobs and $9.3 million of earnings in the Klamath Falls area (0.8 percent of area totals for each) to a high of 1,500 jobs and over $66 million of earnings in the Medford area (1.0 percent and 1.2 percent of area totals, respectively). Employment contributions from the timber program exceed all other programs in the planning area as a whole and in two of the model areas, Salem-Other and Coos Bay. Like employment, earnings contributions from the timber program exceed all other programs in the planning area and in the same model areas noted above, but also in the Eugene and Roseburg areas.

Expenditures by recreation participants on BLM-administered lands provide the largest employment contributions in the Salem-Portland MSA, Eugene, and Roseburg areas. In the Salem-Portland MSA, recreation-based jobs are approximately double those triggered by Timber Harvest and Processing. In the Eugene area, recreation-based jobs exceed timber-based jobs by about 10 percent. In the Roseburg area, these jobs exceed timber-based jobs by about 4 percent. Expenditures by the BLM provide the largest employment and earnings contributions in the Medford and Klamath Falls areas. Jobs triggered through spending by recreation participants exceed those triggered through either BLM or local government spending in all model areas, except Medford and Klamath Falls where they are slightly smaller than contributions triggered by agency spending.

As a share of total area employment and earnings, BLM contributions as a whole range from lows of less than 1 percent in the Salem, Eugene, and Klamath Falls areas to highs of about 3 percent in the Roseburg and Coos Bay areas. Contributions in the Medford area are about one percent. While all contributions to local economies are important, economists often consider those that approach five percent of the total economy—as is the case for Roseburg and Coos Bay— as central to the economic well-being of an area.

The use and management of BLM-administered lands trigger direct, indirect, and induced effects touching every industry as they work their way throughout the local economies. Across the entire planning area, BLM management of public lands mostly affects Agriculture, Governments, Accommodation and Food Services, and Manufacturing. BLM management affects Agriculture more than other industries because of logging and forestry support sectors, but also because personal spending by worker households, regardless of the industry they work in, affects the agriculture industry. BLM payrolls and local government payrolls funded by Federal payments primarily affect the Governments sector. Recreation spending and personal spending by workers and their households affect Accommodations and Food Services. Finally, the forest products industry has a primary effect on Manufacturing. The leading industries for earnings are consistent with those for employment, with one exception; low wages and salaries in Accommodations & Food Services make this industry generally rank last among the top four industries across the planning area and in each of the model areas, whereas it ranks third in the top four for jobs. Appendix O contains detailed tables showing employment and earnings across all industries.

Tables 3-179 and **3-180** provide a more detailed look at BLM contributions to the forest products industry. Because the BLM harvest in 2012 yielded neither very large nor very small logs, the sawmill and logging sectors see most of the direct contributions rather than the Veneer and Plywood sectors. Sawmill and Logging account for 63 percent of all industry employment and 69 percent of all earnings. Other than Klamath Falls, every area shows total employment in these two sectors ranging from 85 to 250 jobs and $5.4 to $16.0 million in payroll. The largest employment and earnings contributions for the forest products industry occur in the Coos Bay and Douglas model areas. BLM harvest contributes 3.2 percent of employment and earnings to the entire industry across the planning area, but it is especially vital to Coos Bay and Roseburg. In Coos Bay, 13 percent of industry jobs and payrolls depend on BLM harvest and in the Roseburg area, the share is 7 percent. These large shares demonstrate the important role that BLM timber harvest plays in these two areas of southern Oregon.

Table 3-181 provides detail into BLM contributions to two recreation-related industries in western Oregon (Arts, Entertainment, & Recreation Services, and Accommodation & Food Services). While the BLM-related contribution to these sectors is primarily affected by recreation participant spending, other BLM activities contribute as well. Across the planning area, spending by recreation visitors as well as local households receiving earnings from BLM-based economic activities result in over 1,600 jobs and $40 million of earnings in these two recreation-related sectors. The Salem-Portland MSA area led all areas with over 450 jobs and $12.7 million in payrolls in these sectors, followed by Eugene, Roseburg, Medford, Coos Bay, Salem-Other, and finally Klamath Falls. BLM-managed lands in the planning area accounts for about one percent of all jobs and earnings in these two recreation-related industries. The contribution is particularly important in the Roseburg area where BLM-managed lands contribute 8.0 percent of industry jobs and 9.3 percent of industry earnings. In Coos Bay, the contribution is 4.6 percent of industry jobs and 5.3 percent of industry earnings. As a share of the total planning area, BLM-managed lands contribute about 0.1 percent of all jobs and less than 0.1 percent of all earnings. Contributions to the Roseburg and Coos Bay areas range from 0.3 to 0.6 percent.

Federal Payments

Federal payments are an important contributor to local governments, providing funds for a variety of public services. Local government spending of Federal payments to employ personnel and purchase materials and services generates jobs and income. Eighteen counties in Oregon contain either O&C or CBWR lands, and therefore receive Federal payments under the Secure Rural Schools and Self-Determination Act (as amended). Each of these counties also receives Federal payments under the Payment in Lieu of Taxes Act. Socioeconomics Issue 3 discusses Federal payments to local governments and their contribution to public services funding. **Tables 3-182** and **3-183** identify the contribution of SRS and PILT payments to each of the eighteen counties' economies.

Tables 3-182 and **3-183** estimate the contribution of BLM-based payments spent in 2012 that support both public and private sector payrolls. County governments spend SRS Title I and III payments directly; they have full discretion in the use of these funds, often using them for public safety and related services. Title II payments are directed by local resource advisory committees for resource-improvement projects on public lands in the area. In 2012, SRS payments contributed over 680 jobs and nearly $35 million in earnings to local economies throughout the planning area. Douglas and Jackson Counties have the largest employment effect with well over 100 jobs, followed by Lane and Josephine with over 90 each. Because each local government sets its own employment compensation rates, county rankings by earnings differ somewhat from those by employment. In terms of total county government payroll, Douglas County leads all counties, followed by Lane, Josephine, and Jackson Counties. PILT payments are typically much smaller than SRS payments, and thus generate small contributions to local economies. Across all of western Oregon PILT payments provide 17 jobs and $0.9 million of earnings. All BLM-based Federal payments combined contribute nearly 700 jobs and $35.7 in earnings across the entire planning area. As a share of total employment and earnings, these estimates accounted for under 0.1 percent for the entire planning area and for each district model area.

Environmental Effects

This section describes the employment and earnings effects of the No Action and action alternatives. Changes in timber harvest are the primary influences on projected future BLM-based employment and earnings in local economies in the planning area. This is because changes by alternative for other resources are either unavailable or very small. For recreation the BLM projects area-wide increases in recreation visits, but it is difficult to project these changes by alternative or by district. Further, there would be modest to no changes in mineral revenues across alternatives, and the grazing program is small. Data in the tables in this section show effects for the year 2018—the mid-point of the first decade in the Woodstock timber management model—as an appropriate point for comparison of economic effects among alternatives.

Table 3-184 shows economic effects by alternative for the entire planning area by BLM program, timber-related industry, and recreation-related industry. With respect to total effects (i.e., direct, indirect, and induced) all the alternatives except for Alternative D would result in an increase in jobs and earnings compared to 2012 figures based on Current-Modified. The difference across alternatives is substantial, ranging from 6,915 jobs and $304 million in earnings under Alternative D up to 12,419 jobs and $584 million in earnings in Alternative C. Under Alternative D, the BLM timber program would account for 35 percent of all jobs and 40 percent of earnings.[73] Alternative D would result in a 15 percent reduction in jobs and earnings compared to Current-Modified. The shares would be highest under Alternative C with 51 percent of all jobs and 52 percent of earnings, a 120 percent increase over Current-Modified. The

[73] Percentages may be calculated from the tables. For example 2,454 divided by 6,915 = 35%; $121.0 divided by $304.2 million = 40%.

timber program under Alternatives A, B, and No Action would range between 40 percent and 47 percent of all BLM-based effects. Compared with Current-Modified, No Action would be a 68 percent increase, Alternative A would be a 9 percent increase, and Alternative B would be a 41 percent increase.

Table 3-184. Employment and earnings in the planning area by alternative.

Program/Industry	Employment (Jobs)						Earnings (Millions of 2012 Constant[1] $)					
	2012	2018					2012	2018				
	Current-Modified	No Action	Alt. A	Alt. B	Alt. C	Alt. D	Current-Modified	No Action	Alt. A	Alt. B	Alt. C	Alt. D
BLM Program												
Recreation	2,782	2,969	2,969	2,969	2,969	2,969	$87.2	$93.0	$93.0	$93.0	$93.0	$93.0
Grazing	95	95	95	95	95	-	$1.4	$1.4	$1.4	$1.4	$1.4	-
Timber	2,897	4,868	3,158	4,086	6,358	2,454	$141.7	$235.1	$154.8	$199.3	$309.7	$121.0
Minerals	6	6	6	6	6	6	$0.3	$0.3	$0.3	$0.3	$0.3	$0.3
Agency Expenditures	1,423	1,855	1,458	1,679	2,259	1,283	$89.2	$115.5	$90.3	$104.2	$141.0	$79.2
Federal Payments to Counties[2]	198	505	305	395	732	203	$10.5	$26.7	$16.2	$20.9	$38.8	$10.7
Totals	**7,403**	**10,298**	**7,992**	**9,230**	**12,419**	**6,915**	**$330.1**	**$471.8**	**$355.9**	**$419.0**	**$584.1**	**$304.2**
Timber-Related Industries												
Forestry, Logging, and Support Activities	795	1,165	783	995	1,559	609	$46.2	$67.8	$45.6	$57.9	$90.7	$35.4
Wood Products Manufacturing	518	985	560	755	1,226	418	$28.7	$54.6	$31.0	$41.8	$67.9	$23.1
Paper Manufacturing	41	70	66	77	120	56	$3.8	$6.4	$6.0	$7.1	$11.0	$5.2
Totals	**1,354**	**2,221**	**1,409**	**1,827**	**2,905**	**1,083**	**$78.7**	**$128.9**	**$82.6**	**$106.8**	**$169.6**	**$63.7**
Recreation-Related Industries												
Arts, Entertainment, and Recreation Services	495	611	537	579	676	506	$13.9	$18.9	$15.4	$17.5	$22.1	$14.0
Accommodation and Food Services	1,150	1,263	1,229	1,247	1,299	1,212	$25.9	$28.3	$27.7	$28.0	$29.0	$27.4
Totals	**1,645**	**1,874**	**1,766**	**1,826**	**1,975**	**1,718**	**$39.9**	**$47.2**	**$43.1**	**$45.5**	**$51.1**	**$41.4**

[1] Earnings in 2018 are expressed in 2012$ with unchanging or constant purchasing power.
[2] Federal payments include only those that would be paid under the O&C formula. Current has been modified as if O&C payments had been made in lieu of SRS payments.
Note: Totals may not add due to rounding.

Change in total timber volume (including both ASQ and non-ASQ volume) is the most influential factor affecting economic consequences of the timber program under the different alternatives, but composition of log sizes is also important. Logs of 24 inches or more (peeler logs) generate about three times more direct employment than smaller sawlogs. Logs less than 8 inches (roundwood) generate the least direct employment. Across the decision area, harvests in 2012 (243 MMbf) were 96 percent sawlogs with only 3 percent peeler logs and 1 percent roundwood. Under the No Action alternative (400 MMbf) and Alternatives A (249 MMbf), B (332 MMbf), and C (555 MMbf) harvests would have more volume than current, but peeler logs would account for 15 to 24 percent of total harvest. Roundwood would be steady across these alternatives at 13 to 14 percent of total volume. Given harvest volumes that would be greater than current and a mix of log sizes that would generate more employment than current, these alternatives show greater positive job and income effects. Under Alternative D (180 MMbf) harvests volumes would be less than current, but they would include a mix similar to the other alternatives.

As the BLM timber harvest changes, market forces prompt private timberland owners to adjust their harvest volumes. The BLM anticipates that in 2018 private timberland owners would either increase their harvests modestly (6.4 MMbf short log under Alternative D) or decrease their harvests in varying amounts (-43 MMbf short log under the No Action alternative, -8.9 MMbf short log under Alternative A, -27 MMbf short log under Alternative B, and -78 MMbf short log under Alternative C). See the discussion of market consequences in Socioeconomics Issue 1. The employment and earnings effects shown in **Table 3-184** incorporates these market implications.

Under all alternatives except Alternative D, the BLM recreation program would remain the second largest generator of jobs among all BLM-based effects. Under Alternative D it would rank first among programs. The BLM's projections of recreation visits are limited to area-wide increases over time that do not vary by alternative. Therefore, the analysis treated the increases proportionally across all areas and constant across all alternatives. Consequently, economic effects by district area would also be constant across all alternatives in 2018 (3,000 jobs and $93 million of earnings). Because of relatively low wages in the service and retail industries, the recreation program would rank either second or third among all BLM programs with respect to earnings.

Across all alternatives, BLM expenditures would continue to be an important generator of jobs and income across the planning area, regardless of the alternative (**Table 3-184**). Jobs resulting from this spending would range from about 1,300 under Alternative D to more than 2,200 under Alternative C. Employment effects under Alternative A would be similar to Current-Modified, while those under Alternatives B and No Action would be 250 to 400 jobs greater than Current-Modified. The timber program would be the primary determinant of BLM budgets in this part of the analysis, with the timber program budget changing proportionally with harvest volume, using a fixed rate of $200 per Mbf. The BLM assumed that non-timber portions of BLM district budgets would be unchanged from current across all alternatives (see Socioeconomics Issue 7).

Payments to counties under the formula in the O&C Act would generate about 200 jobs under Alternative D. Under Alternative C, payments would generate over 700 jobs, and, under the other alternatives, from 300 to 500 jobs. Alternative D would result in very similar numbers of jobs as those generated under Current-Modified. Earnings would follow the pattern of jobs, ranging from about $10.7 million under Alternative D to $38.8 million under Alternative C.

Employment in timber-related industries would range from about 1,100 jobs under Alternative D to 2,900 jobs under Alternative C. Job counts under every alternative except D would increase compared to Current-Modified. Forestry, logging, & support activities would continue to see the largest number of workers among timber-related industries.

Recreation-related industries include Arts, Entertainment, & Recreation Services as well as Accommodation and Food Services. Typically, while these industries are aligned with spending by recreation participants, all BLM programs, not just recreation, affect economic effects in these industries. For example, local ranchers who earn a living by running livestock on BLM-managed lands may spend a portion of their income in the food service industry. Nonetheless, these industries offer a good indicator of recreation-based effects. Because wages in these industries are typically low, total earnings triggered by BLM management range from a low of 30 percent of those triggered by timber harvest under Alternative C to a high of 77 percent under Alternative D.

Table 3-185 shows total job and labor income effects by BLM district model area and by alternative. Except for the Medford District, Alternative C would have the largest employment and earnings increases across all district model areas and for the planning area as a whole. In the Medford District, the No Action alternative would have the largest employment and earnings increases. Alternative C's employment and earnings effects would be 20 percent greater than the No Action alternative, the next largest alternative. Alternative C would 68 percent larger than Current-Modified (12,419 versus 7,403 jobs). Alternative D would trigger smaller effects, a reduction from Current-Modified by 7 percent.

Table 3-185. BLM-based employment and earnings by district model area by alternative.

District Model Area	Employment (Jobs)						Earnings (Millions of 2012 Constant[1] $)					
	2012	2018					2012	2018				
	Current-Modified[2]	No Action	Alt. A	Alt. B	Alt. C	Alt. D	Current-Modified[2]	No Action	Alt. A	Alt. B	Alt. C	Alt. D
Coos Bay	1,198	1,232	906	931	1,600	625	$54.4	$55.6	$39.1	$40.5	$74.4	$24.8
Eugene	1,297	2,237	1,835	2,202	3,352	1,541	$56.6	$104.0	$83.3	$101.8	$160.6	$68.2
Klamath Falls	231	289	219	270	299	190	$8.7	$11.4	$8.0	$10.5	$11.9	$8.5
Medford	1,326	2,675	1,688	2,110	2,318	1,461	$58.6	$123.1	$75.5	$95.8	$105.5	$66.0
Roseburg	1,225	1,709	1,081	1,292	1,933	977	$51.8	$76.1	$43.4	$54.6	$87.8	$38.0
Salem-Other	851	881	925	1,041	1,362	829	$43.5	$45.8	$47.5	$54.1	$72.2	$42.1
Salem-Portland MSA	1,275	1,276	1,337	1,384	1,555	1,292	$56.5	$55.8	$59.1	$61.8	$71.7	$56.6
Planning Area Totals	**7,403**	**10,298**	**7,992**	**9,230**	**12,419**	**6,915**	**$330.1**	**$471.8**	**$355.9**	**$419.0**	**$584.1**	**$304.2**

[1] Earnings in 2018 are expressed in 2012$ with unchanging or constant purchasing power.

[2] Current has been modified as if O&C payments had been made in lieu of SRS payments. PILT payments are excluded.

Note: Totals may not add due to rounding.

The Eugene District model area would experience the largest effects across all action alternatives, while the Medford area would have the largest effects under Current-Modified and under the No Action alternative. Distribution of timber harvest across the areas primarily accounts for the differing effects. Spending by recreation participants in addition to timber processing are the chief reasons why the Salem-Portland MSA area shows relatively large effects across all alternatives.

Table 3-186 provides a more detailed view of selected timber- and recreation-related industries by district model area. Coos Bay ranked first for economic effects of processing BLM timber in timber-related industries in 2012 (363 jobs and $20.8 million in earnings), but would fall behind other model areas under the No Action alternative and under all the action alternatives. The Medford area would lead all areas under No Action, but the Eugene area would lead all areas in 2018 under all action alternatives. In all cases, the Klamath Falls area would experience the smallest economic effects. The same relationship among areas holds for employment as well as earnings.

Table 3-186. BLM-based employment and earnings in timber-related[1] industries and recreation-related[2] industries by district model area by alternative.

Metric		**Employment (Jobs)**						**Earnings (Millions of 2012 Constant[3] $)**					
Year		**2012**	**2018**					**2012**	**2018**				
Alternative		**Current-Modified[4]**	**No Action**	**Alt. A**	**Alt. B**	**Alt. C**	**Alt. D**	**Current-Modified[4]**	**No Action**	**Alt. A**	**Alt. B**	**Alt. C**	**Alt. D**
Timber-related[1] Industries	**District Model Area**												
	Coos Bay	363	358	229	235	501	117	$20.8	$20.5	$13.1	$13.5	$28.7	$6.7
	Eugene	212	517	386	515	907	286	$12.5	$30.7	$23.0	$30.6	$53.8	$17.0
	Klamath Falls	21	40	13	33	41	26	$1.2	$2.3	$0.8	$1.9	$2.3	$1.5
	Medford	139	563	244	379	411	191	$7.9	$32.0	$13.9	$21.6	$23.4	$10.9
	Roseburg	280	454	188	270	526	152	$16.0	$25.8	$10.7	$15.4	$29.8	$8.7
	Salem-Other	196	173	208	237	311	184	$11.8	$10.6	$12.7	$14.5	$19.1	$11.3
	Salem-Portland MSA	142	115	142	158	209	127	$8.5	$6.9	$8.5	$9.4	$12.5	$7.6
	Planning Area Totals	**1,354**	**2,221**	**1,409**	**1,827**	**2,905**	**1,083**	**$78.7**	**$128.9**	**$82.6**	**$106.8**	**$169.6**	**$63.7**
Recreation-related[2] Industries	**District Model Area**												
	Coos Bay	204	216	202	203	232	190	$4.4	$4.6	$4.2	$4.2	$5.1	$3.8
	Eugene	309	374	353	372	432	338	$7.4	$9.7	$8.9	$9.7	$12.2	$8.3
	Klamath Falls	40	45	42	44	46	42	$0.8	$1.0	$0.8	$0.9	$1.0	$0.9
	Medford	239	320	269	291	300	259	$5.3	$8.2	$6.2	$7.0	$7.3	$5.8
	Roseburg	289	324	299	307	332	295	$6.5	$7.6	$6.6	$6.9	$7.9	$6.4
	Salem-Other	109	115	117	123	139	112	$2.8	$2.9	$3.0	$3.2	$3.8	$2.9
	Salem-Portland MSA	454	481	484	486	494	482	$12.7	$13.3	$13.5	$13.6	$14.0	$13.4
	Planning Area Totals	**1,645**	**1,874**	**1,766**	**1,826**	**1,975**	**1,718**	**$39.9**	**$47.2**	**$43.1**	**$45.5**	**$51.1**	**$41.4**

[1] Timber-related industries include forestry, logging and support activities; wood products manufacturing; and paper manufacturing.
[2] Recreation-related industries include arts, entertainment, & recreation services and accommodation & food services. Totals include local resident spending whose earnings may be associated with non-recreation BLM programs.
[3] Earnings in 2018 are expressed in 2012$ with unchanging or constant purchasing power.
[4] Current has been modified as if O&C payments had been made in lieu of SRS payments. PILT payments are excluded.
Note: Totals may not add due to rounding.

By virtue of large recreation participant numbers, the Salem-Portland MSA area would continue to have the largest economic effects of any of the model areas from recreation-related industries regardless of the alternative. The Klamath Falls area would continue to experience the smallest effect. As noted above, total earnings in recreation-related industries triggered by BLM management are substantially smaller than those triggered by the BLM's timber harvest. Only in the Salem-Portland MSA would recreation-related earnings exceed timber-related earnings (except under Alternative C).

Appendix O includes tables showing detailed economic effects by district model area and by alternative.

Effects of Alternatives in Relation to the Broader Economic Context in Western Oregon

In the future, social and economic change in the planning area will result from the combined actions of many individuals, businesses, governments, and other organizations. A vast number of decisions made by thousands of individuals, businesses, and governments over the next decade will affect growth and change in population and employment with consequences for housing, and transportation. For economic effect purposes, it is impossible to account for and project the effect of all such decisions separately. However, standard projections of population and employment that carry forward the economic momentum observed in current conditions and trends are a measure of how the economy is likely to develop, given known or reasonably foreseeable development. This section of the effects analysis takes such an approach by using an interpolation of employment in 2018 based on county-level forecasts by the Oregon Employment Department (Krumenauer and Turner 2014). These projections account for reasonably foreseeable levels of economic growth and enable an analysis that considers the cumulative effects of the draft alternatives in the context of the broader western Oregon economy.

The BLM assumed, for purposes of this part of the analysis, that the State forecasts capture the effects of BLM management under the No Action alternative (i.e., the 1995 RMPs as written)[74] but do not capture the effects of Alternatives A through D.

According to the State's projections, the planning area as a whole will experience 8.5 percent growth in employment between 2012 and 2018 (**Table 3-187**). The State attributes this growth to continuing recovery from the 2007 to 2009 recession, particularly for the construction industry; a growing health care sector, due in part to an aging population; and the need for replacement workers due to baby boomer retirements. However, growth will vary substantially among the district areas. Jobs in the Portland-MSA and Eugene areas will increase by over 9 percent, Salem-Other, Roseburg, and Medford by about 8 percent, and Klamath Falls by 6.6 percent. Forecasts for the Coos Bay area indicate job losses of over 7,000 jobs, a decrease of 17.5 percent in the 6-year period.

[74] Harvest volumes, the major driver of job and income effects in this analysis, have been consistent with 1995 RMPs. However, the administrative vehicles for offering timber have become more diverse in recent years. These vehicles, such as permits and stewardship sale contracts, are used to offer an increasing share of total timber volume.

Table 3-187. Current and projected employment by district model area by alternative (average annual jobs, percent).

District Model Area	Area Total Employment (Average Annual Jobs)		BLM-based Total Employment (Average Annual Jobs)					BLM-based Share of Area Total Employment (Percent)				
	2012	2018	2018					2018				
	Current	Projected[1]	No Action	Alt. A	Alt. B	Alt. C	Alt. D	No Action	Alt. A	Alt. B	Alt. C	Alt. D
				Incremental Change from No Action								
Coos Bay	40,276	33,235	1,232	-326	-301	368	-607	3.7%	2.8%	2.8%	4.8%	1.9%
Eugene	186,049	203,072	2,237	-402	-35	1,115	-696	1.1%	0.9%	1.1%	1.6%	0.8%
Klamath Falls	31,881	33,997	289	-70	-19	10	-99	0.9%	0.6%	0.8%	0.9%	0.6%
Medford	145,525	156,964	2,675	-987	-565	-357	-1,214	1.7%	1.1%	1.3%	1.5%	0.9%
Roseburg	46,527	50,422	1,709	-628	-417	224	-732	3.4%	2.2%	2.6%	3.8%	2.0%
Salem-Other	359,408	388,098	881	44	160	481	-52	0.2%	0.2%	0.3%	0.4%	0.2%
Salem-Portland MSA	1,147,490	1,258,230	1,276	61	108	279	16	0.1%	0.1%	0.1%	0.1%	0.1%
Planning Area Totals	**1,957,157**	**2,124,018**	**10,298**	**-2,306**	**-1,068**	**2,121**	**-3,383**	**0.5%**	**0.4%**	**0.4%**	**0.6%**	**0.3%**

[1] BLM estimates based on total employment projections by Oregon Employment Department (Krumenauer and Turner2014).
Note: Totals may not add due to rounding.

Under the No Action alternative, BLM-based contributions to the planning area in 2018 would account for 0.5 percent of all employment (10,298 divided by 2,124,018). The share of employment by district area would range from 0.1 percent to 0.2 percent in the Salem district areas to 3.4 percent and 3.7 percent in the Roseburg and Coos Bay areas, respectively.

Table 3-187 shows how each action alternative would affect total employment compared to the No Action alternative. Under Alternative A, BLM-based employment would drop by 2,300 jobs compared to No Action. Most of the reduction would occur in the Medford area, followed by drops in Roseburg, Eugene, and Coos Bay. In contrast, the two Salem district model areas combined would experience very modest increases in jobs (about 100). Under Alternative B, declines in BLM-based employment would still occur, but would be moderated somewhat compared with Alternative A, (i.e., a loss of approximately 1,100 jobs). Medford, Roseburg, and Coos Bay would see the largest reductions, while the two Salem district models would see greater increases compared with Alternative A. Under Alternative C, employment would increase compared to the No Action alternative in aggregate across the planning area and in each model area except Medford, which would see a loss of approximately 360 jobs. Compared with the No Action alternative, Alternative C would offer the largest gains (or least reductions for Medford) of any action alternative. In contrast, Alternative D would prompt the biggest reductions of BLM-based jobs of any alternative. Compared with No Action, Alternative D would reduce employment across the planning area by approximately 3,400 jobs, a third of which would occur in the Medford area. Roseburg, Eugene, and Coos Bay would all experience reductions of 600 to 700 jobs.

The number of jobs affected is an important consideration, but the share of BLM-based employment to total employment puts such changes in context. Under all alternatives, the Salem and Klamath Falls areas retain a small share of total area BLM-based employment (less than one percent). In the Eugene and Medford areas, BLM-based employment would range from 0.8 percent to 1.7 percent of total area employment. Thus while Medford is vulnerable to some of the largest changes in BLM-based jobs, the employment is not a large share of area employment.

BLM-based jobs changes would have the largest effects in Coos Bay and Roseburg. Under Alternatives A, B, and D, Coos Bay would not only experience a relatively large job loss across the economy (7,000 jobs from 2012 to 2018, or 17 percent of 2012 employment), but BLM-based jobs would accentuate job losses by another 600 jobs. Under the No Action alternative, BLM-based jobs in Coos Bay would account for 3.7 percent of all jobs, but that share would drop in half to 1.9 percent under Alternative D. Alternative C would increase the share to 4.8 percent. Effects in Roseburg would not be as severe as those in Coos Bay. Job reductions in the Roseburg area under Alternatives A, B, and D would reduce BLM-based shares from 3.4 percent under No Action to 2.2 percent, 2.6 percent, and 2.0 percent, respectively. State projections show Roseburg area employment increasing by 4,000 jobs over the next six years, and thus any reductions in BLM-based employment would moderate projected increases. Under Alternative C, BLM-based employment in Roseburg would increase to 3.8 percent of total employment.

Issue 3

What would be the effect of alternatives on payments distributed to counties from activities on BLM-administered lands?

Summary of Analytical Methods

The Federal Government makes, or has made, four types of payments to counties based on BLM-administered lands in the planning area:

- Secure Rural Schools (SRS) payments
- O&C Act formula derived payments
- Payments in lieu of taxes (PILT)
- Coos Bay Wagon Road-based payments (these only occur in Coos and Douglas counties)

Secure Rural Schools

The O&C counties face an uncertain future regarding payments through the Secure Rural Schools and Community Self-Determination Act (SRS) (USDI BLM 2014b), because the program has not been authorized beyond 2014. Given this uncertainty, the BLM assumed, for the purpose of analyzing the potential effects of the RMP alternatives, that the distribution formula in the 1937 O&C Act, as amended, will determine future payments (USDI BLM 2014a). The potential for county payments to change due to future legislation is unrelated to the BLM's management alternatives. Comparing management alternatives using payments derived under the formula in the O&C Act illustrates how the management alternatives could affect payments if they were based on harvest amounts.

O&C Act Formula Derived Payments

The distribution formula in the O&C Act contains three key components:

- Volume (in million board feet) of commercial timber harvested from O&C lands.
- Stumpage price (per million board feet) of this harvest.
- Each county's proportion of the total assessed value of all O&C county lands as they were in 1915. (See **Table 3-188** for each county's proportion.)

Under the O&C Act, counties share 50 percent of the commercial stumpage value (commercial harvest volume times stumpage price), and the other 50 percent goes to the Federal Government. The Federal Government spends one-half of its amount, or 25-percent of the total receipts, in the counties to help maintain and develop the O&C lands (Babcock 2014, USDI BLM 2014b).

The BLM based its analysis of the impacts of management alternatives on payments to counties on the results of the vegetation model, which estimates the impacts of the alternatives on the future volume and stumpage value of commercial timber harvests on BLM-administered lands. To estimate the effect of the alternatives on payments to counties, the BLM distributed 50-percent of the estimated commercial stumpage value using each county's proportion of the total assessed value for all O&C lands.

Payments In Lieu Of Taxes

The Federal Government makes payments in lieu of taxes (PILT) to counties to help offset the lost tax revenue from Federal ownership of land within the counties (DOI 2014). PILT payments to O&C counties totaled approximately $3.8 million in 2012 and $5.1 million in 2013 (DOI 2014). These figures represent approximately 10 percent of SRS payments to O&C counties in 2012, and approximately 13 percent in 2013 (USDI BLM 2014c). PILT payments derive from a complex formula that makes projecting future payments challenging. A recent report by the Congressional Research Service describes this issue:

> "The authorized level of PILT payments is calculated under a complex formula. No precise dollar figure can be given in advance for each year's PILT authorized level. Five factors affect the calculation of a payment to a given county: the number of acres eligible for PILT payments, the county's population, payments in prior years from other specified Federal land payment programs, state laws directing payments to a particular government purpose, and the Consumer Price Index as calculated by the Bureau of Labor Statistics" (Corn 2014, Summary).

As an example of the complexity, one of the provisions in the PILT formula is subtracting certain Federal payments made the prior year from the current year's PILT payment. This provision, however, does not currently apply to all Federal payments tied to O&C lands. For example, the PILT does not require offsetting prior years SRS payments when calculating PILT payments for lands administered by the BLM (Corn 2014). The percentage of total Federal acres eligible for PILT payments attributed to BLM-administered acres in the O&C counties varies from approximately 5 percent for Multnomah County, to approximately 97 percent for Polk County (USDI 2014). Even though SRS payments derived from BLM-administered O&C acres are exempt from PILT calculations, payments tied to other Federal acres in these counties are not.

Given the complexity of the PILT formula and the challenges of estimating future offsetting Federal payments, the BLM did not include PILT payments in its analysis of the effects of the management alternatives on payments to counties.

Coos Bay Wagon Road Lands

Similar to PILT, the complexity and uncertainty around Coos Bay Wagon Road (CBWR)-based payments make it impossible for the BLM to project credibly the specific payments from these lands over time at the scale of this western Oregon planning effort. Rather than direct payments of timber receipts according to the O&C Act formula, the 1939 Coos Bay Wagon Road Act created an in lieu of tax payment program for the CBWR lands. The CBWR lands occur only in Coos and Douglas Counties. Under this payment program, the BLM collects receipts for timber sold from the Coos Bay Wagon Road lands and uses them to pay in lieu of taxes an amount that is based on the established method of taxation used in the State of Oregon for other lands of similar character in the state. Currently the State of Oregon utilizes a Forest Land Class method for forestland taxation and assigns maximum assessment values based on state-established productivity classes. The Oregon Department of Revenue publishes the assessment values annually. The Coos and Douglas County tax assessors also establish tax rates on an annual basis. The tax rate established by the county assessors is the tax rate that is paid on the State of Oregon established taxable value for the CBWR lands.

The CBWR-based payments depend not only on the receipts for timber sold from CBWR lands, but also on assessment values and tax rates which would change over time. In 2013, CBWR payments totaled approximately $337,635 (USDI BLM 2014g). It is likely that the relative amount of these CBWR-based payments will generally follow the revenues to the counties derived from the O&C lands.

Effects Analysis

The BLM's analysis of the effects of management alternatives on payments to counties used the outputs from the vegetation model that describes how alternatives would affect harvest volumes and stumpage prices. The vegetation model produces data on total harvest volume, but county payments use commercial sales volume, a subset of total harvest volume. The BLM estimated commercial sales volume at 75 percent of total harvest volume, based on data from the actual 2012 harvest.

Likewise, the vegetation model provides stumpage prices per thousand board feet measured in long logs, while payments to the U.S. Treasury and O&C counties use thousand board feet of short logs. The BLM converted those prices to short log basis and then subtracted costs per thousand board feet for road maintenance, slash management, and other actions that support timber harvests. The vegetation model produces all price outputs in 2012 dollars. This facilitates comparisons of prices and stumpage values across alternatives and time. For example, the model estimates stumpage prices in 2018 for the No Action alternative of $310.41 per thousand board feet. Even though the estimate represents a stumpage price in 2018, the dollar values are in 2012 dollars. That is, the price estimates do not include an inflation factor for estimates at different years in the future.

The BLM calculated stumpage values by multiplying harvest volumes by stumpage prices, and calculated payments to counties in 2018 and in 2028 (mid points of the first two decades) using the O&C payment formula described above. The BLM assumed that the distribution formula among the counties would remain as it was in 2012.

The BLM selected these two periods because they provide estimated payments up to 14 years in the future that allow comparisons with what payments would have been in 2012. Estimating the amounts and sources of county payments beyond these years would be overly speculative.

Background

To compensate counties for foregone property tax payments on the O&C lands owned by the Federal Government, Congress passed the Oregon and California Lands Act of 1937, which mandated that the counties receive a percentage of the receipts from the timber harvested and sold from the O&C acres. Congress amended the 1937 Act in 1956 and in 1976. Currently, counties receive 50 percent of the stumpage value of commercial timber harvested and sold from the O&C acres. Of the remaining 50 percent, the Federal Government spends 25 percent in the counties to help maintain and develop the O&C acres, and the remaining 25 percent goes to the U.S. Treasury.

According to the O&C Act, counties can use their O&C payments at their discretion and do so by providing county services mandated by the State of Oregon (Johnson 2009; USDI BLM 2014b). These services include sheriff's patrols, regulating and financing county and local roads, solid waste disposal, education, circuit courts, a county assessor, and a district attorney (Johnson 2009, includes a complete list of mandated county services).

The O&C payment formula remained largely unchanged until the early 1990s. In response to declining timber harvests and payments to counties in the 1980s, Congressional budget appropriations for 1991, 1992, and 1993 included a "floor" payment equivalent to the average of payments from 1986 through 1990 (USDI BLM 2014b). In the Omnibus Budget Reconciliation Act of 1993 (OBRA), Congress included a safety-net payment also based on the average of payments for 1986 through 1990. In 1994, counties received 85 percent of this amount. In 1995 through 1999, payments to counties declined by 3 percent each year. The OBRA effectively decoupled payments to counties from current timber harvests on BLM-administered lands. Congress repealed the OBRA and passed the SRS in 2000. Like the OBRA, the SRS based payments to counties on an average of harvests from previous years. The 2000 SRS used the three highest harvest years between 1986 and 1990. Initially set to expire in 2006, Congress continued reauthorizing the program on an annual basis (Adams and Gaid 2008). Congress passed a one-year reauthorization of the SRS program on October 2, 2013, at 95 percent of the 2012 amount (USDA FS 2014). Counties use the SRS payments in the same way they used O&C payments—to pay for state mandated services including public safety, county roads, and education (Tuchmann and Davis 2013).

As described below under Affected Environment, payments to counties have declined substantially since 2003. Counties have dealt with these declines in different ways. Some tried funding vital services such as public safety by passing property tax levies. Others considered sales taxes and/or outsourcing services such as libraries and public health. Some have also reduced staff, or limited or ended services. A sampling of reports describing the financial hardships and challenges that some of the O&C counties currently face include: Mortenson 2012a, Mortenson 2012b, Zheng 2013a, Zheng 2013b, and Mapes 2014a. As noted above (Socioeconomics Background), in 2012 the Oregon Secretary of State identified a total of eight counties, all in the planning area, whose financial condition may indicate a higher risk of distress than other counties.

The Governor's Task Force on Federal Forest Payment and County Services (Governor's Task Force, 2009) noted the concerns for counties of ending of the SRS program:

> "Many of these hard hit counties looked beyond deep reductions in services and the depletion of their reserves to the likelihood of an unprecedented and unmanageable fiscal crisis within two to four years after the cessation of Federal forest payments. Only a belated reauthorization of these payments by the Federal Government in October 2008 averted a crisis which, compounded by the effects of the current recession, could have forced the collapse of as many as nine 'crisis counties' over the next several years." (Governor's Task Force 2009, p. 4).

The Task Force concluded that county governments and residents had limited ability to make up the lost Federal payments. For example, the Task Force estimated that increasing property taxes and adding taxes such as a lodging tax and real estate transfer tax—if enacted by voters—would only recover between 8 to 24 percent of lost Federal payments (Governor's Task Force 2009).

The inability of some O&C counties to provide public safety services in the face of declining Federal payments is a major concern for county and State officials. Josephine County released dozens of inmates in 2012 because of budget cuts. In early 2014, Polk County announced it would no longer provide 24-hour sheriff patrols because of budget reductions. Residents in these and other O&C counties rejected public-safety tax measures over the previous years (Templeton 2013, Mapes 2013b, Zheng, 2013a). In response to these developments, the Oregon Legislature passed a bill that would allow the governor to impose certain taxes, but only with the approval of county officials. These taxes would fund public safety services. Under the bill, the State would match the taxes paid by county residents (Mapes 2013a, 2013b).

The BLM and the Forest Service provide additional background information on the history of payments to counties from activities on Federal lands (USDA FS 2014, USDI BLM 2014b).

Affected Environment

Table 3-188 shows the recent historical trend in SRS payments. From a high of approximately $117 million in FY 2007, payments declined to approximately $38 million in FY 2012, an approximately 68 percent decline.

Table 3-188. SRS payments to counties, 2003 to 2012.

County	FY 2012 SRS Distributions	FY 2010 SRS Distributions	FY 2007 SRS Distributions	FY 2003 SRS Distributions
Benton	$771,004	$2,381,408	$3,255,508	$3,116,768
Clackamas	$1,057,665	$4,703,493	$6,429,918	$6,155,895
Columbia	$712,608	$1,745,801	$2.386,600	$2,284,891
Coos	$2,333,965	$5,626,088	$7,691,152	$7,363,379
Curry	$1,442,516	$3,093,288	$4,228,685	$4,048,471
Douglas	$10,719,614	$21,342,441	$29,176,221	$27,932,820
Jackson	$5,455,997	$13,279,952	$18,154,381	$17,380,697
Josephine	$5,512,586	$10,237,513	$13,995,209	$13,398,776
Klamath	$1,073,616	$1,983,094	$2,710,992	$2,595,458
Lane	$5,247,157	$12,940,962	$17,690,964	$16,937,029
Lincoln	$127,952	$305,091	$417,076	$399,301
Linn	$1,237,384	$2,237,337	$3,058,556	$2,928,209
Marion	$518,109	$1,237,315	$1,691,474	$1,619,389
Multnomah	$248,900	$923,749	$1,262,813	$1,208,996
Polk	$898,016	$1,830,549	$2,502,455	$2,395,808
Tillamook	$220,123	$474,587	$648,785	$621,135
Washington	$142,145	$533,910	$729,883	$698,777
Yamhill	$272,785	$610,183	$834,152	$798,603
Totals	**$37,992,142**	**$85,486,761**	**$116,864,821**	**$111,884,403**

Source: USDI BLM 2014g.

Not all counties rely on SRS payments to the same extent. **Table 3-189** shows FY 2012 SRS payments and payments as a percentage of total county revenues and of each county's general or discretionary fund. Of the counties in the planning area, Coos, Curry, Douglas, and Josephine rely most heavily on Federal payments as measured by percentage of their total county revenues. However, expressing payments as a percentage of *total* county revenue does not demonstrate the importance of Federal payments to some of the counties. This is because Federal payments are part of the counties' discretionary or general fund, which is a subset of total county funds. **Table 3-189** shows that for the four counties cited above, Federal payments account for between 25 and 82 percent of general fund revenues.

Table 3-189. SRS payments and county revenues.

County	FY 2012 SRS Distribution	SRS Payment as a Percent of County Revenues	SRS Payment as a Percent of General Fund
Benton	$771,004	0.8%	3.4%
Clackamas	$1,057,665	0.3%	0.8%
Columbia	$712,608	1.4%	2.4%
Coos	$2,333,965	11.0%	82.3%
Curry	$1,442,516	8.9%	25.5%
Douglas	$10,719,614	11.4%	69.9%
Jackson	$5,455,997	1.7%	9.0%
Josephine	$5,512,586	8.1%	59.0%
Klamath	$1,073,616	1.8%	8.4%
Lane	$5,247,157	2.2%	6.8%
Lincoln	$127,952	0.1%	0.4%
Linn	$1,237,384	1.5%	4.9%

County	FY 2012 SRS Distribution	SRS Payment as a Percent of County Revenues	SRS Payment as a Percent of General Fund
Marion	$518,109	0.2%	0.7%
Multnomah	$248,900	-	0.1%
Polk	$898,016	1.8%	5.4%
Tillamook	$220,123	0.6%	1.5%
Washington	$142,145	-	0.1%
Yamhill	$272,785	0.5%	1.0%
Totals	**$37,992,142**	**-**	**-**

Source: USDI BLM 2014g; County budget data available at each county's website, respectively.

As described above under Analytical Methods, the BLM estimated the impacts of the proposed management alternatives on county payments using the formula in the O&C Act as amended. As the starting point for this analysis, the BLM calculated what the counties would have received in 2012 if payments had been based on the O&C Act. **Table 3-190** shows the 2012 SRS payments that counties received ($38.0 million) and the 2012 payments the counties would have received based on the O&C Act formula (approximately $11.7 million). The total 2012 O&C payment would have been approximately 31 percent of the SRS payment ($11.7 million divided by $38.0 million). The amount each county would have received is based on its percent of the total assessed value of all O&C lands, as shown in the table. For example, Benton County would have received $328,733 based on 2.81 percent of $11,698,670.

Table 3-190. County payments in 2012, actual payments and payments based on O&C Act formula.

County	2012 SRS Payment (Actual)	2012 Payment, Under O&C Act Formula	Percent of Total O&C Lands Payment
Benton	$771,004	$328,733	2.81%
Clackamas	$1,057,665	$649,276	5.55%
Columbia	$712,608	$240,993	2.06%
Coos	$2,333,965	$690,222	5.90%
Curry	$1,442,516	$427,001	3.65%
Douglas	$10,719,614	$2,930,517	25.05%
Jackson	$5,455,997	$1,833,182	15.67%
Josephine	$5,512,586	$1,413,199	12.08%
Klamath	$1,073,616	$273,749	2.34%
Lane	$5,247,157	$1,786,387	15.27%
Lincoln	$127,952	$42,115	0.36%
Linn	$1,237,384	$308,845	2.64%
Marion	$518,109	$170,801	1.46%
Multnomah	$248,900	$127,516	1.09%
Polk	$898,016	$252,691	2.16%
Tillamook	$220,123	$65,513	0.56%
Washington	$142,145	$73,702	0.63%
Yamhill	$272,785	$84,230	0.72%
Totals	**$37,992,142**	**$11,698,670**	**100.00%**

Sources: USDI BLM 2014g; Babcock 2014; Output from vegetation model.

Environmental Effects

Table 3-191 shows commercial harvest volumes, stump price, stump value, and total payment to O&C counties based on 50 percent of stump value, by alternative for 2018 and for 2028. **Table 3-192** shows the breakdown by county for each alternative.

Table 3-191. Total payments to O&C counties by alternative in 2018 and 2028.

Year	Commercial Harvest Volume (Thousand Board Feet, Short Log)[a]	Stumpage Price per Thousand Board Feet Short Log, 2012$	Stumpage Value (Harvest Volume × Stumpage Price), 2012$	Area-wide Payments to O&C Counties, 2012$
No Action				
2018	299,667	$310.41	$93,018,783	$46,509,392
2028	293,698	$287.81	$84,529,383	$42,264,692
Alt. A				
2018	186,461	$301.59	$56,234,740	$28,117,370
2028	182,762	$300.64	$54,946,390	$27,473,195
Alt. B				
2018	248,744	$292.91	$72,859,670	$36,429,835
2028	242,196	$283.63	$68,694,703	$34,347,352
Alt. C				
2018	416,244	$324.04	$134,880,041	$67,440,021
2028	411,550	$323.42	$133,101,547	$66,550,773
Alt. D				
2018	135,034	$277.02	$37,407,288	$18,703,644
2028	134,881	$271.69	$36,646,367	$18,323,183

[a] The vegetation model produces data on total harvest volume, but county payments use commercial sales volume, a subset of total harvest volume. The BLM estimated commercial sales volume at 75 percent of total harvest volume, based on data from the actual 2012 harvest.

Source: BLM based on results of vegetation model and O&C payments formula.

Table 3-192. Payments to O&C Counties by alternative for 2018 and 2028 (2012$).

County	2012 Payment, Under O&C Act Formula	Analysis Year	No Action	Alt. A	Alt. B	Alt. C	Alt. D
Benton	$328,733	2018	$1,306,914	$790,098	$1,023,678	$1,895,065	$525,572
		2028	$1,187,638	$771,997	$965,161	$1,870,077	$514,881
Clackamas	$649,276	2018	$2,581,271	$1,560,514	$2,021,856	$3,742,921	$1,038,052
		2028	$2,345,690	$1,524,762	$1,906,278	$3,693,568	$1,016,937
Columbia	$240,993	2018	$958,093	$579,218	$750,455	$1,389,264	$385,295
		2028	$870,653	$565,948	$707,555	$1,370,946	$377,458
Coos	$690,222	2018	$2,744,054	$1,658,925	$2,149,360	$3,978,961	$1,103,515
		2028	$2,493,617	$1,620,918	$2,026,494	$3,926,496	$1,081,068
Curry	$427,001	2018	$1,697,593	$1,026,284	$1,329,689	$2,461,561	$682,683
		2028	$1,542,661	$1,002,772	$1,253,678	$2,429,103	$668,796
Douglas	$2,930,517	2018	$11,650,603	$7,043,401	$9,125,674	$16,893,725	$4,685,263
		2028	$10,587,305	$6,882,035	$8,604,012	$16,670,969	$4,589,957
Jackson	$1,833,182	2018	$7,288,022	$4,405,992	$5,708,555	$10,567,851	$2,930,861
		2028	$6,622,877	$4,305,050	$5,382,230	$10,428,506	$2,871,243
Josephine	$1,413,199	2018	$5,618,335	$3,396,578	$4,400,724	$8,146,754	$2,259,400
		2028	$5,105,575	$3,318,762	$4,149,160	$8,039,333	$2,213,441
Klamath	$273,749	2018	$1,088,320	$657,946	$852,458	$1,578,096	$437,665
		2028	$988,994	$642,873	$803,728	$1,557,288	$428,762
Lane	$1,786,387	2018	$7,101,984	$4,293,522	$5,562,836	$10,298,091	$2,856,046
		2028	$6,453,818	$4,195,157	$5,244,841	$10,162,303	$2,797,950
Lincoln	$42,115	2018	$167,434	$101,223	$131,147	$242,784	$67,333
		2028	$152,153	$98,904	$123,650	$239,583	$65,963
Linn	$308,845	2018	$1,227,848	$742,299	$961,748	$1,780,417	$493,776
		2028	$1,115,788	$725,292	$906,770	$1,756,940	$483,732
Marion	$170,801	2018	$679,037	$410,514	$531,876	$984,624	$273,073
		2028	$617,064	$401,109	$501,471	$971,641	$267,518
Multnomah	$127,516	2018	$506,952	$306,479	$397,085	$735,096	$203,870
		2028	$460,685	$299,458	$374,386	$725,403	$199,723
Polk	$252,691	2018	$1,004,603	$607,335	$786,884	$1,456,704	$403,999
		2028	$912,917	$593,421	$741,903	$1,437,497	$395,781
Tillamook	$65,513	2018	$260,453	$157,457	$204,007	$377,664	$104,740
		2028	$236,682	$153,850	$192,345	$372,684	$102,610
Washington	$73,702	2018	$293,009	$177,139	$229,508	$424,872	$117,833
		2028	$266,268	$173,081	$216,388	$419,270	$115,436
Yamhill	$84,230	2018	$334,868	$202,445	$262,295	$485,568	$134,666
		2028	$304,306	$197,807	$247,301	$479,166	$131,927
Totals	**$11,698,670**	**2018**	**$46,509,392**	**$28,117,370**	**$36,429,835**	**$67,440,021**	**$18,703,644**
		2028	**$42,264,692**	**$27,473,195**	**$34,347,352**	**$66,550,773**	**$18,323,183**

Source: USDI BLM, based on results of vegetation model and O&C payments formula.

The total payment in 2012 under the O&C Act formula would have been approximately $11.7 million. Under all the alternatives, payments to counties in 2018 and in 2028 would exceed this amount. Payments under Alternative C would be the highest, approximately $67 million in 2018. Payments under Alternative D would be the lowest among the alternatives, at approximately $18.7 million, but would still be 60 percent above what the 2012 payment would have been.

Across all alternatives payments would be slightly lower (from 2 to 9 percent) in 2028 compared to 2018 reflecting lower non-ASQ-based timber revenues in the second decade (see Issue 1 above). **Table 3-192** shows the distribution of total O&C payments to each county, by alternative, for 2018 and 2028, along with estimated O&C payments in 2012, had county payments been based on the O&C formula that year.

Payments to individual counties under all alternatives exceed what the counties would have received in 2012. The difference in payments would be substantial for many counties. For example, Polk County would have received approximately $253,000 in 2012 under the O&C formula but would receive approximately $404,000 in 2018 under Alternative D and approximately $1.5 million under Alternative C (in 2012$); these figures would be the high and low payments to Polk County that year. See the discussion of the earnings and employment effects of these payments in Issue 2 (Table 3-180).

Issue 4

How would the alternatives contribute to economic stability in the planning area?

Summary of Analytical Methods

Growth and stability are classic goals of economic development. Historic growth rates of employment and earnings offer an indication of economic growth in the planning area, while the volatility of these rates offer insights into the economic stability of both communities (geographic areas) and industries (business groups). Long-term growth rates express fundamental economic shifts or trends for geographic areas and industries. Issue 2 discusses short-term trends that may not represent fundamental economic shifts.

This issue presents an analysis of the cumulative effects on economic stability of past, present, and reasonably foreseeable future actions, including both land management on BLM-administered lands and non-BLM-administered lands.

For the purposes of this issue, geographic areas are the same BLM district model areas defined under Issue 2 for which historic economic data exist and which function as economic units. Industries are business groups defined by the Bureau of Economic Analysis for which the same historic economic data exist (BEA 2014).

Using historic data from the Bureau of Economic Analysis (BEA 2014), the BLM estimated the magnitude and volatility of growth rates for all employment and earnings—inclusive of all industries—in all seven economic model areas within the planning area. The BLM also estimated comparable rates for those industries that BLM management of timber and recreation most affects. Other resources the BLM manages have very small effects, as shown in the contribution analysis (See Issue 2). Employment comprises all wage and salary workers. Earnings include total payroll compensation for the same workers.

Growth rates are an average of year-over-year changes covering six national business cycles (1969-2007), the longest period for which complete data are available. The coefficient of variation of these annual growth rates indicates volatility; this is a generally accepted metric in the finance and economic disciplines. Stability is the inverse of volatility. Thus, highly volatile growth rates indicate long-term instability, while modest to low volatility of growth rates indicates long-term stability.

The BLM computed growth rates for resource-related industries nationally rather than for the planning area alone in order to understand the inherent and historic volatility of resource-based industries, independent of public land management policies and budgets. Observing characteristics of these industries nationally minimizes the influence that past public land policies in western Oregon may have had on local resource industry behavior. It therefore offers a better representation of the industries when analyzing the impacts of future land management alternatives.

To provide a common reference point, the BLM calculated growth rates and volatility for the United States economy as a whole over the same time period. The BLM then indexed growth rates and volatility for both BLM district model areas and national industries to the United States economy. Thus, an index >1.00 indicates higher growth rates or volatility compared with the United States economy, an index <1.00 indicates lower growth rates or volatility, and an index of 1.00 indicates a match with the United States economy.

Affected Environment

Table 3-193 presents long-term growth rates and their volatility for employment and earnings for the United States as a whole, for the seven model areas in western Oregon, and for selected resource-related industries nationally. Timber-related industries include Forest and Wood Products (logging and primary wood manufacturing) and Paper Manufacturing (pulp, paperboard, and related paper or container industries). Recreation-related industries include Arts, Entertainment, and Recreation Services (excluding museums, zoos, historical sites, and nature parks) and Accommodations; and Eating & Drinking Places.

Table 3-193. Growth and volatility of employment and earnings by geographic area and selected resource-related industries over six United States business cycles, 1969-2007.

Geographic Area or Resource-related Industry	Employment (Jobs)			Earnings (2012$)		
	Growth Rate		Growth Volatility	Growth Rate		Growth Volatility
	Average Annual (%)	Indexed to U.S.	Indexed to U.S.	Average Annual (%)	Indexed to U.S.	Indexed to U.S.
Geographic Area						
United States	1.82%	1.00	1.00	2.97%	1.00	1.00
BLM District Model Area						
Coos Bay	1.33%	0.73	2.86	1.55%	0.52	3.72
Eugene	2.42%	1.33	1.61	3.01%	1.01	1.83
Klamath Falls	1.19%	0.66	2.80	1.82%	0.61	2.88
Medford	3.28%	1.80	1.07	3.95%	1.33	1.42
Roseburg	1.81%	1.00	2.16	2.16%	0.73	2.99
Salem-Other	2.43%	1.34	1.18	3.32%	1.12	1.37
Salem-Portland MSA	2.57%	1.41	1.15	3.71%	1.25	1.15
U.S. Industry						
Timber-Related						
Forest and Wood Products Industries	0.42%	0.23	15.50	1.36%	0.46	6.15
Paper Manufacturing	-0.91%	-0.50	3.77	0.74%	0.25	5.14
Recreation-Related						
Arts, Entertainment, and Recreation Services	3.85%	2.12	0.85	5.41%	1.82	1.12
Accommodations	2.24%	1.23	1.59	3.50%	1.18	1.56
Eating and Drinking Places	3.64%	2.00	0.83	3.63%	1.22	0.96

Source: Bureau of Economic Analysis 2014. Employment includes all wage and salary workers. Earnings includes total payroll compensation for the same workers. Data were available and adjusted for inflation over six U.S. business cycles spanning 38 years.

Table 3-193 shows that between 1969 and 2007 (six business cycles), United States employment grew at an average annual rate of 1.8 percent, while earnings grew at 2.97 percent (net of inflation). As a rule, earnings growth that exceeds employment growth suggests increases in employee productivity over the long term.

Among BLM district model areas, Salem-Portland MSA, Salem-Other (non-MSA counties), and Eugene had similar growth rates for employment and earnings. All of these areas exceeded the national growth rate by up to 40 percent for employment and up to 25 percent for earnings. For example, Salem-Portland's average annual employment growth rate was 2.6 percent, 41 percent higher than the average annual rate for the United States of 1.8 percent. However, these areas also exceeded national volatility of employment and earnings growth by 15 to 80 percent, which indicates instability. Growth rates in the southern half of the planning area mostly lagged behind the United States. Klamath Falls had the lowest growth rates of any model area (1.2 percent). In addition, Klamath Falls' volatility of employment (2.80 percent) and earnings growth (2.88 percent) greatly exceeded those of United States economy. Coos Bay's volatility was also very high.

High volatility, or instability, is typically characteristic of commodity-based economies (Carter *et al*. 2011). The Medford area is an exception to the general pattern for southwestern Oregon. This area experienced the highest employment and earnings growth rates in western Oregon accompanied by modest to high stability. Growth and stability in the Medford area may result from its position as a strong regional service center coupled with a well-balanced economy.

National industries related to timber and recreation demonstrate a wide range growth and volatility characteristics. Over six United States business cycles, the Forest and Wood Products Industries have grown slowly and show a very high level of volatility (or instability). These commodity-based industries are subject to the highs and lows of business cycles not only in the United States, but also internationally. Employment volatility has been 15 times higher and earnings volatility 6 times higher than the United States economy. Paper Manufacturing has shown a negative growth rate for employment coupled with a very modest positive rate for earnings. This disparity suggests strong improvements in productivity driven by technology advances. Volatility for both employment and earnings is high in Paper Manufacturing, but not as high as in the Forest and Wood Products Industries.

Recreation-related industries exhibit a mix of growth rates and volatility. The Arts, Entertainment, and Recreation Services industry has shown strong employment and earnings growth rates coupled with stability over the six business cycles. The same pattern holds true for employment in the Eating and Drinking Places industry, but earnings lag behind. Employment and earnings in the Accommodations industry has grown somewhat faster than the United States, but with volatility that is roughly 50 percent higher than the United States economy.

Environmental Effects

Under the alternatives, some resource-related industries may increase in employment and earnings while others decrease. If industries increase that exhibit historic instability, they may inject greater economic instability into their host communities. Conversely, if industries increase that exhibit historic stability, their greater presence may add economic stability to host communities.

As discussed under Issue 2, the BLM recreation specialists project that there will be a constant rate of increase in recreation visits in the planning area between 2012 and 2018 regardless of the alternative and district area. For that reason, recreation-related industries vary little between alternatives and therefore would not strongly influence changes in the economic stability or instability of district model areas. As a result, alternative BLM timber programs are the focus when considering economic stability in the planning area.

Because this issue considers a long-term perspective of economic stability, the BLM considers timber harvest levels over 50 years. However, as described in Forest Management, total harvests under each alternative do not vary more than 15 percent in any year compared to average harvest levels in the first decade and all change in harvest levels over time are driven by non-ASQ harvest, such as restoration thinning in the reserves. Furthermore, each alternative would maintain its relative rank among all other alternatives in terms of total timber harvest through 50-years. Said differently, Alternative C would have the greatest harvest at every point in the planning period, followed by No Action, B, A, and D. All alternatives, except Alternative D, show timber harvest volumes exceeding current (2012) levels.

Because the timber industry has a long, national history of high volatility, alternatives with harvest volumes that exceed current levels are likely to introduce greater instability into local economies, based on past business cycles. The expansion of existing timber-based firms or the addition of new ones would bring additional jobs and earnings to the planning area, but could make the whole planning area more vulnerable to large fluctuations inherent in domestic and international timber markets. Alternative C with the largest harvest volumes would have the greatest effect on jobs and earnings, but also the greatest potential for increased economic instability. The No Action alternative, Alternative B, and Alternative A, based on their lower volumes compared to Alternative C, would have comparatively lesser effects on jobs and earnings and lower potential for increased economic instability. With harvest volumes below current levels on BLM-administered lands, Alternative D would show job and earnings reductions, but may moderate existing economic instabilities across the planning area.

Because the historic volatility index of timber-related industries exceeds the index for every model area, each model area that shows increases in timber industry activity over current (**Table 3-186**) could bring additional exposure to greater economic instability. Greater potential for instability could be expected in the Eugene and Medford areas for all alternatives, in both Salem areas under Alternatives B and C, in the Roseburg area under the No Action alternative and Alternative C, in the Klamath Falls area under the No Action alternative and Alternatives B and C, and in the Coos Bay area under Alternative C only.

Greater economic stability alone, whether achieved through the moderation of historically volatile industries or an increase in historically stable industries, does not guarantee an increase in the economic well-being of an area. Industrial specialization can be beneficial to an area, though it may, at the same time, subject the area to greater volatility. Growth and stability are both important though sometimes competing concepts in a portfolio of economic growth and development considerations.

Issue 5

How would the RMP alternatives affect the capacity and resiliency of different types of communities in the planning area?

Summary of Analytical Methods

This analysis focuses on the potential effects of the RMP alternatives on selected communities of place in the planning area, specifically on small and mid-size cities and tribal communities. The BLM conducted many of the socioeconomic analyses in this Section at an appropriate county or District level, but recognized that this scale can mask differences among smaller communities within these broad areas, or fail to show how county-level impacts can affect communities.

Communities in Land Use Planning

The BLM uses a variety of social science information in land use planning. The BLM Land Use Planning Handbook (USDI BLM 2005) states that social science information can include the economic, political, cultural, and social structure of communities, regions, and the Nation as a whole; social values, beliefs, and attitudes; how people interact with the landscape; and sense-of-place issues.

While the other socioeconomic analyses focus more on the economic effects of the alternatives, this analysis focuses on the social effects of the alternatives on communities.

Communities exist at a variety of scales but are commonly one of two types: communities of interest, unified by a common interest, or communities of place, unified by a common geography. To analyze the effects of the alternatives on communities in western Oregon, the BLM considered analyzing the effects on communities of interest. However, due the practical difficulties of comprehensively identifying such communities and analyzing how the alternatives would affect them, the BLM decided instead to focus on communities of place. Further, because much of the socioeconomic analysis in the EIS is at the county level, the BLM opted to gain a different perspective on the potential impacts of the alternatives by analyzing communities at the sub-county level.

A "community of place" is a distinct geographic area within which residents or Tribal members would generally associate themselves with a single location. For purposes of this analysis, this location is an incorporated city or Tribal land.[75]

Incorporated cities comprise approximately 70 percent of the population of the planning area, justifying special consideration in the socioeconomic analysis. In addition, there are seven Federally-recognized Tribes with land in the planning area. This analysis includes them as separate communities of place, as the United States acknowledges them as sovereign nations with inherent powers of self-government.

A unique feature of the analytical approach to this issue was 1- to 2-hour telephone interviews with representatives of the governments of approximately 15 communities. This gave community representatives the opportunity to tell their stories and provided insights into the social values, beliefs, and attitudes of their communities, thereby supplementing the statistical data the BLM collected regarding capacity and resiliency.

Capacity and Resiliency

Capacity and resiliency are commonly used terms in the social sciences when researching and analyzing communities. Resiliency in particular is a term used increasingly frequently with respect to communities' responses to natural disasters such as hurricanes and to other changes such as climate or major economic change.

Many communities in western Oregon have experienced large socioeconomic changes, particularly since the listing of the northern spotted owl, the subsequent injunction barring timber harvest in northern spotted owl habitat, and the adoption of Northwest Forest Plan in 1994. As part of the Northwest Forest Plan monitoring program, the Forest Service has been leading socioeconomic monitoring to answer the question: What is the status and trend of socioeconomic well-being? (USDA FS 2008). In light of this ongoing monitoring and the potential effects of the updated RMPs for Western Oregon on communities, the BLM analyzed the potential socioeconomic impacts of the alternatives through the lenses of capacity and resiliency, which are measures of a community's ability to face change.

There are different definitions of capacity and resiliency though they tend to have common elements. This analysis uses the following definitions:

- Community Capacity: a community's ability to face changes; respond to external and internal stresses, create and take advantage of opportunities, and meet its needs
- Community Resiliency: a community's ability to adapt to change over time

There is some overlap between the two concepts and the presentation of results does not attempt to draw a fine line between them.

Community Selection

There are 161 cities (incorporated places) in the planning area. The BLM decided to exclude 27 very small cities (populations below 500) and very large cities (populations over 40,000) from the group for analysis bringing the number to 134. The exclusions were for the following reasons:

[75] Many people live in unincorporated communities. The Bureau of the Census recognizes these areas as Census Designated Places (CDPs). However, while census data are available for CDPs, they do not have local elected or appointed officials who can speak for them, and this analysis does not include them.

- Very small cities represent a very small share of the planning area population (less than one percent), and information and interviews could be difficult to obtain.
- Large cities tend to mirror or contribute significantly to the socioeconomic characteristics of the counties in which they are located. Other analytical questions are focused on counties, so that including large cities would be duplicative and reduce the desired focus on communities below the county level.

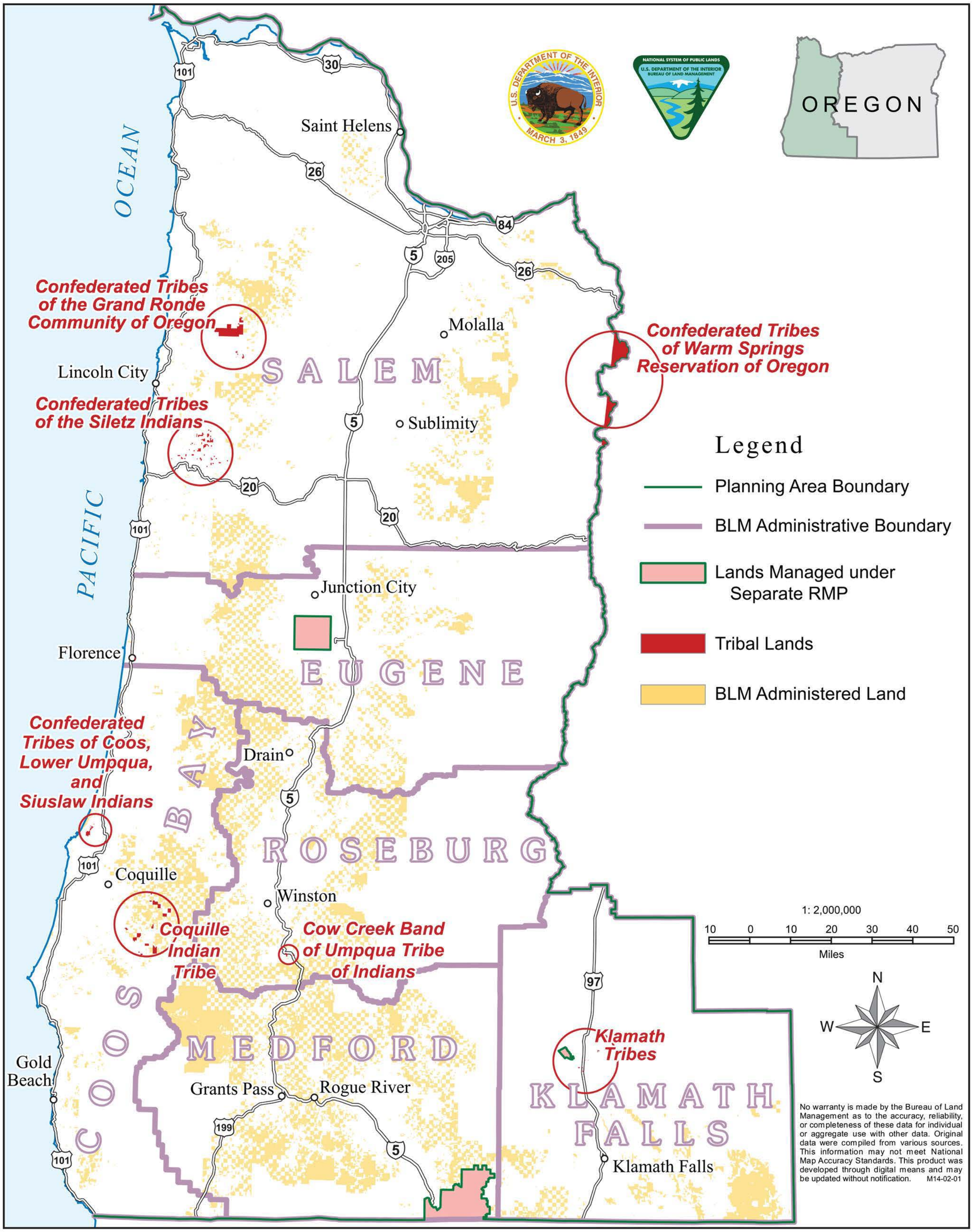
Analyzing all 134 cities, including personal interviews, would have been impractical. The BLM decided that a 10 percent sample of the 134 cities (i.e., approximately 13 cities) plus the Tribes would be sufficiently representative of the entire group to enable an analysis sufficient to assess effects on community capacity and resiliency. The BLM stratified (weighted) the sample so that it would be representative of the diverse geography of the planning area.[76] The stratification was such that: 1) there were at least one or two cities from each BLM office; 2) there would be at least three rural cities from the Salem District;[77] and 3) Klamath Falls would be the representative city for the Klamath Falls Field Office.[78] Within these stratification rules, the BLM selected 13 cities at random from the group of 134 cities[79] (**Table 3-194** and **Map 3-7**). Appendix O shows all 134 cities in the sample group. The Planning Criteria document (USDI BLM 2014) contains a description of the selection methodology in detail, and is incorporated here by reference (USDI BLM 2014, pp. 140-148).

[76] Stratification was necessary because approximately 89 of the 134 cities (66%) are in the Salem District and a random sample would likely have resulted in eight or nine of the 13 cities coming from the Salem District which would not be representative of the diverse geography of the planning area.
[77] There are many urban cities in the Portland metropolitan area that, if sampled, would reveal little regarding the potential impacts of the RMPs.
[78] The Klamath Falls Field Office has a total of four cities and three of them are small with populations under 850.
[79] To make the selections, the BLM used the random number function in Microsoft's Excel program.

Table 3-194. Selected communities (cities and Tribes) for analysis of capacity and resiliency.

Selected Communities	County	District/Field Office
City		
Coquille	Coos	Coos Bay
Drain	Douglas	Roseburg
Gold Beach	Curry	Coos Bay
Florence	Lane	Eugene
Grants Pass	Josephine	Medford
Junction City	Lane	Eugene
Klamath Falls	Klamath	Klamath Falls
Lincoln City	Lincoln	Salem
Molalla	Clackamas	Salem
Rogue River	Jackson	Medford
St. Helens	Columbia	Salem
Sublimity	Marion	Salem
Winston	Douglas	Roseburg
Tribe		
Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians	Coos	Coos Bay
Coquille Indian Tribe	Coos	Coos Bay
Cow Creek Band of Umpqua Tribe of Indians	Douglas	Roseburg
Confederated Tribes of the Grand Ronde Community of Oregon	Yamhill	Salem
Confederated Tribes of Warm Springs Reservation of Oregon	Clackamas and Marion	Salem
Klamath Tribes	Klamath	Klamath Falls
Confederated Tribes of the Siletz Indians	Lincoln and Polk	Salem

Notes: While data for Tribes used census data for land owned by the Tribes, the analysis also considered Tribal members not living on Tribal-owned land.



Map 3-7: Selected Communities (Cities and Tribes) used for the Analysis of Capacity and Resiliency

Data and Information About Communities

The BLM collected data and information about the selected communities from three sources: 1) publicly available data sources, primarily the U.S. Bureau of Census American Community Survey; 2) internet sites, primarily the official websites of the selected communities; and 3) interviews with community representatives.

Data Baseline

The publicly available data sources provided a data baseline for assessing potential impacts from the RMP alternatives. The BLM created the baseline from data on 13 metrics (measures) of capacity and resiliency including population, housing, jobs, unemployment, wages, income, health insurance, education, recreation, and assessable base. They are largely consistent with the metrics identified in **Table 37** of the Planning Criteria (**Appendix O**). The metrics chosen are among a large number of accepted potential metrics that exist (see, for example, Jepson and Colburn 2013). The BLM selected the metrics in consultation with the RMP's for Western Oregon Cooperative Agencies Advisory Group's Socioeconomics Working Group based on their relevance to the capacity/resiliency question, availability of data across the communities, and analytic efficiency. The BLM summed each community's scores for all 13 metrics and expressed the totals as a percentage of the total theoretical maximum score; a higher percentage meant a higher level of capacity and resiliency.

The BLM recognized four capacity and resiliency categories based on the data score spread: high (over 65 percent), medium (60 to 64 percent), low (50 to 59 percent), and very low (less than 50 percent) and assigned the communities to one of the categories based on its baseline score. Because of data limitations for the Tribes (see next section) the BLM did not assign the Tribes to a category.

Data Limitations

Most data have limitations and the data in this analysis are no exception. First, most of the data for this analysis are from the American Community Survey, which the Bureau of Census derives from a sample of American households. They provide more detailed socioeconomic data than the decennial census, but the data have "margins of error" (degrees of confidence, or reliability), and these tend to be greater for smaller communities because their sample sizes are smaller. Some communities commented on this during the interviews, and the BLM invited them to provide supplementary data.

The data are particularly unreliable for the tribes, some of whom have very small populations living on tribal lands. The tribes commented on this during the interviews, and they preferred to discuss the entire tribal membership, not just the population living on tribal lands.

Additionally, the way the metrics were selected and applied may incorrectly "favor" one community over another, giving it a higher score. In other words, had the BLM selected different metrics, a different score might have been the result. Further, arguably, some metrics are more important to capacity and resiliency than others, whereas the calculations treat the metrics equally without weighting.

The BLM acknowledges these data limitations but believes that use of a relatively large number of metrics (i.e., 13 for the cities and 12 for the Tribes) mitigates the limitations and produces results that are useful and informative, especially when reviewed in conjunction with the interviews (see next section).

Interviews with City and Tribal Representatives

The BLM conducted interviews with city and tribal representatives in order to supplement the baseline data with representatives' personal experiences, perspectives, perceptions, and insights, and to help tell each community's "story" in relation to the RMPs. The BLM developed brief, introductory geographic and economic profiles of the selected communities to have some familiarity with the communities prior to the interviews. Appendix O contains these profiles.

The BLM contacted each of the selected communities' governments by phone and letter inviting their participation. Appendix O contains copies of the letters. Of the 13 cities, 11 participated in an interview, 1 provided written responses to questions, and 1 declined to participate. Of the seven Tribes, two participated in an interview. The interviews typically lasted 60 to 90 minutes.

Each community government could decide who it wanted to participate. City representatives included city managers/administrators, mayors, county commissioners, and members of advisory boards. Tribal representatives included Tribal chairpersons, executive directors, and other staff. The interview conversations ranged widely but focused on the following questions:

- How do you view your community's "capacity," that is your community's ability to face changes, respond to external and internal stresses, create and take advantage of opportunities, and meet its needs?
- How do you view your community's "resiliency," that is your community's ability to adapt to change over time?
- How do the ways the BLM manages its resources affect your community (its capacity and resiliency)?
- Have changes in the BLM's resource management over time affected your community? In what ways?
- Are there changes in the ways that the BLM manages its resources that would increase your community's capacity and resiliency?

Note that the while many of the interviewees were community leaders, they spoke as individuals from the communities and not as official representatives of the communities. Thus, while the BLM takes their views as representative of the communities, it recognizes that the communities did not formally endorse the opinions expressed and that diversity of opinion in each community is likely.

Final Adjusted Capacity and Resiliency Categories

The interviews provided valuable insights into the communities. Following each interview, the BLM summarized the interview and sent it to the interview participants for comment. Appendix O contains all 14 interviews/written responses.

Based on what the interviews revealed about the communities and including insights that supplemented or put into perspective the baseline data, the BLM adjusted some of the communities' final assigned capacity and resiliency categories. This last step was qualitative and was grounded in the interviews as documented.

Tribal Statement

The tribes requested the following statement be included, given the data limitations described above, and the difficulty of using these data in an analysis of capacity and resiliency of the tribes in the planning area. The Cooperating Agency Advisory Group's Tribal Working Group developed the following statement:

> *There are varying acreages of O& C lands located within the ancestral homelands of the seven western Oregon Tribes. Management of these lands has a direct impact on the cultural interests, traditional lifeways, and economic wellbeing of Tribal members.*
>
> *As defined above, capacity and resiliency from a social sciences perspective is a measure of a community's or group of people's ability to respond to certain events such as natural disasters, major economic change, external and internal stresses and to take advantage of opportunities to meet needs.*

However, it must be well communicated and understood that when applying a measure of capacity and resiliency to Tribes, that meaning may appropriately be interpreted differently.

Census data and the developed metrics used in this analysis become problematic when assessing Tribal capacity and resiliency. Oregon Tribes which had their federal status terminated in the 1950s and then were restored to federal recognition in the 1980s do not have a single reservation where all Tribal members live. The Congressional Acts restoring these Tribes established multiple county service areas where the Tribes have historical and cultural interests and where many Tribal members reside. These county service areas also have legal meaning for Tribal members to receive governmental services. The census data and metrics when applied to counties and cities focuses on a specific geographic location and the population living in this area. Using this same approach for the identified Tribal reservations is inaccurate because the focus for Tribes is a distinct group of people with special legal status living in multiple county locations. Applying the developed metrics to only Tribal members living on the specified reservation and in the respective county location gives conclusions which most likely are not reflective of the total Tribal population.

In respect to historic resiliency, Tribes have demonstrated perseverance and resiliency to the highest degree. Tribes have endured over two hundred years of devastation following the European occupation of native lands in North America. Tribes have also adapted to adverse actions, laws and policies of the United States government. Tribal people are still here, and in many cases, thriving – preserving culture, raising families, executing government functions, and significantly contributing to native and non-native people and their communities. Given that, it becomes clear that resiliency takes on a unique meaning when applied to Tribes.

For Tribes and their members there is also a culture dimension when determining capacity and resiliency. Those with strong ties to Tribal culture and active in traditional lifeways may have a very robust sense of capacity and resiliency which is not reflected by the non-Tribal analytical model used in this analysis.

Effects Analysis

The regional scale of the combined RMPs and the geographical breadth of their potential impacts is such that it is not possible to analyze with useful precision how the different RMP alternatives would affect one specific local community versus another. Instead, the analysis assumed that effects to regions and counties will affect the local communities within those regions and counties, and either increase or decrease local community capacity depending on the different effects.

The capacity and resiliency effects analysis applied the environmental effects outputs from Issues 2 and 3 to the local communities as identified in the final adjusted capacity and resiliency categories. The key outputs from these issues were economic activity (jobs) and county payments. The analysis assumed that the communities in the categories were generally representative of the communities in the BLM district economic areas that the Issue 2 analysis modeled.

Affected Environment

Capacity and Resiliency Baseline

Table 3-195 presents the baseline data. Column 2 of the table shows the comparison (reference) number used in applying the metric. For example, for the first metric, "Population size compared to city average in sample", the comparison number is 7,264, which is the average population size of the thirteen cities in the sample (or in the case of the Tribes, the seven Tribes). Column 3 explains how the data should be interpreted, that is what the purpose of the metric is and "what it is telling us" about capacity and/or resiliency. Column 4 explains how the scoring works. For example, in the case of the first metric, a city with a population 150 percent higher than 7,264 gets a score of 5 (e.g., St. Helens, which has a population of 12,807), whereas a city with a population between 125 percent and 75 percent of 7,264 has a score of 3 (e.g., Lincoln City, which has a population of 7,926). This differential reflects the fact that, other things being equal, places with greater population tend to have higher resilience (Harris *et al*. 2000).

Table 3-195. Capacity and resiliency metrics.

1 Capacity/Resiliency Metric	2 Comparison (Reference) Number	3 Interpretation	4 Metric Application Method; City data compared to reference number. Scores range from 5 to 1. (5=higher capacity, 1=lower capacity)	Cities and Scores												
				Coquille	Drain	Florence	Gold Beach	Grants Pass	Junction City	Klamath Falls	Lincoln City	Molalla	Rogue River	St. Helens City	Sublimity	Winston
Population size compared to city average in sample	7,264	Higher population = more capacity	150%=5, 150%-125%=4, 125%-75%=3, 75%-50%=2, 50%=1	2	1	3	1	5	2	5	3	3	1	5	1	3
Population change compared to State change rate (2000 to 2012)	12%	Greater increase in population = more resiliency	150%=5, 150%-125%=4, 125%-75%=3, 75%-50%=2, 50%=1	1	3	4	5	5	4	2	2	5	5	5	5	4
Population in 20-64 age cohort compared to State	61%	Greater population in this "working" cohort = more capacity	150%=5, 150%-125%=4, 125%-100%=3, 100%-75%=2, 75%=1	3	2	2	3	2	3	4	3	3	2	4	2	3
Percent of housing that is owner occupied compared to State rate	63%	Higher share of owner occupied housing generally associated with resiliency	150%=5, 150%-115%=4, 115%-85%=3, 95%-75%=2, 75%=1	2	3	3	3	2	2	2	2	3	2	2	3	2
Unemployment rate compared to State	7%	A lower unemployment rate = more capacity	150%=1, 150%-115%=2, 115%-85%=3, 85%-55%=4, 55%=5	5	2	5	4	3	3	3	3	3	4	2	5	3
Jobs Sector Distribution Concentration Compared to the State (1)	0	A distribution closer to the State's = more resiliency	200%=1, 200%-175%=2, 175%-100%=3, 100%-0%=4, 0%=5	1	1	3	2	4	3	3	1	3	4	4	4	3
Percent of jobs paying over $3,333 per month compared to State	37%	A greater share of higher paying jobs = more capacity	125%=5, 125%-100%=4, 100%-75%=3, 75%-50%=2, 50%=1	3	2	2	2	2	3	2	1	2	2	2	2	4
Median household income compared to State	50,036	Higher household incomes = more capacity	150%=5, 150%-100%=4, 100%-75%=3, 75%-50%=2, 0%=1	3	2	2	4	5	2	2	2	5	2	4	5	2
Percent of population in poverty compared to State	15%	A smaller poverty population = more capacity	150%=1, 150%-135%=2, 135%-100%=3, 100%-50%=4, 50%=5	5	4	4	4	2	2	1	3	4	3	3	5	1
Percent of population with health insurance compared to State	84%	A higher share of the population with insurance = more capacity	125%=5, 125%-100%=4, 100%-75%=3, 75%-50%=2, 50%=1	3	3	3	3	4	3	3	3	3	3	3	4	4
Percent of population with a 4 year degree compared to State	20%	A higher share of the population with a degree = more capacity	>150%=5, 150%-125%=4, 125%-100%=3, <100%=1	1	1	1	1	1	1	1	1	1	1	1	5	1
Assessed Property Value Per Capita (dollars) compared to the city average in sample	75,099	Higher property value = higher tax base and more capacity	125%=5, 125%-100%=4, 100%-75%=3, 75%-50%=2, 50%=1	2	2	5	4	4	3	3	5	3	3	3	3	2
Acres of outdoor recreation land (per 1,000 population) compared to the State as a whole	8,605	More recreation land generally associated with more capacity	125%=5, 125%-100%=4, 100%-50%=3, 50%-25%=2, 50%=1	2	5	2	5	3	2	5	2	1	2	1	1	5
			Totals	**33**	**30**	**38**	**41**	**42**	**33**	**36**	**31**	**39**	**33**	**39**	**45**	**37**
			Comparison with Maximum Total of 65	**51%**	**46%**	**58%**	**63%**	**65%**	**51%**	**55%**	**48%**	**60%**	**51%**	**60%**	**69%**	**57%**

1 Capacity/ Resiliency Metric	2 Comparison Number	3 Interpretation	4 Metric Application Method Scores range from 5 to 1	Tribes and Scores						
				Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians	Confederated Tribes of the Grand Ronde	Confederated Tribes of the Siletz Indians	Confederated Tribes of Warm Springs Reservation of Oregon	Coquille Indian Tribe	Cow Creek Band of Umpqua Tribe of Indians	Klamath Tribes
Population compared to tribal average in sample	753	Higher population = more capacity	150%=5, 150%-125%=4, 125%-75%=3, 75%-50%=2, 50%=1	1	2	2	5	1	1	1
Population change compared to State change rate (2000 to 2012)	12%	Greater increase in population = more resiliency	200%=5, 200%-150%=4, 150%-100%=3, 100%-50%=2, 50%=1	1	5	5	4	3	1	5
Population in 20-64 age cohort compared to State	61%	Greater population in this “working” cohort = more capacity	150%=5, 150%-125%=4, 125%-90%=3, 90%-70%=2, 70%=1	2	3	2	3	2	3	1
Percent of housing that is owner occupied compared to State rate	57%	Higher share of owner occupied housing generally associated with resiliency	125%=5, 125%-100%=4, 100%-75%=3, 75%-50%=2, 50%=1	1	1	3	4	1	5	2
Unemployment rate compared to State	7%	A lower unemployment rate = more capacity	198%=1, 198%-125%=2, 125%-75%=3, 75%-50%=4, 50%=5	1	1	2	1	3	5	3
Jobs Sector Distribution Concentration Compared to the State (1)	0	A distribution closer to the State’s = more resiliency	200%=1, 200%-100%=2, 100%-75%=3, 75%-0%=4, 0%=5	4	1	3	1	4	4	2
Percent of jobs paying over $3,333 per month compared to State	37%	A greater share of higher paying jobs = more capacity	150%=5, 150%-125%=4, 125%-75%=3, 75%-50%=2, 50%=1	2	3	2	2	2	3	2
Median household income compared to State	50,036	Higher household incomes = more capacity	150%=5, 150%-125%=4, 125%-75%=3, 75%-50%=2, 50%=1	2	2	3	3	3	2	1
Percent of population in poverty compared to State	15%	A smaller poverty population = more capacity	200%=1, 200%-120%=2, 120%-75%=3, 75%-50%=4, 50%=5	2	2	1	2	2		4
Percent of population with health insurance compared to State	84%	A higher share of the population with insurance = more capacity	105%=5, 105%-85%=4, 85%-78%=3, 78%-20%=2, 20%=1	5	4	3	2	3	3	4
Percent of population with a 4 year degree compared to State	20%	A higher share of the population with a degree = more capacity	100%=5, 100%-50%=4, 50%-25%=3, 25%-15%=2, 15%=1	1	2	2	2	2	3	5
Acres of outdoor recreation land (per thousand population) compared to the State as a whole	8,605	More recreation land generally associated with more capacity	150%=5, 150%-125%=4, 125%-45%=3, 45%-15%=2, 15%=1	3	5	3	1	3	5	5
Totals				**24**	**31**	**31**	**30**	**29**	**35**	**35**
Comparison with Maximum Total of 60				**40%**	**52%**	**52%**	**50%**	**48%**	**58%**	**58%**

Sources:

Environmental Resources Management (ERM) based on:

U.S. Census Bureau; American Community Survey, 2012 American Community Survey 5-Year Estimates, Tables DP03, DP04, DP05, S1901 and S1701; generated by Joan Huston; using American FactFinder; http://factfinder2.census.gov ; (May 2014).

U.S. Census Bureau; American Community Survey, 2009 American Community Survey 5-Year Estimates, Tables DP03, DP04, DP05, S1901 and S1701; generated by Joan Huston; using American FactFinder; http://factfinder2.census.gov ; (May 2014).

U.S. Census Bureau; Census 2000, Summary File 1, Table DP05; generated by Joan Huston; using American FactFinder; http://factfinder2.census.gov ; (May 2014).

U.S. Census Bureau. 2013. OnTheMap Application. Longitudinal-Employer Household Dynamics Program. http://onthemap.ces.census.gov/ ; generated by Clive Graham July 3, 2014

Assessed Property Value derived from individual County Assessors Offices Summary of Assessment and Tax Rolls

Oregon Parks and Recreation Department. 2011. Oregon Statewide Outdoor Recreation Resource/Facility Bulletin Final Report. A Component of the 2013-2017 Oregon-Statewide Comprehensive Outdoor Recreation Plan.

Notes:

(1) A measure of difference in the distribution of jobs by sector in a 5-mile radius of the community compared to the distribution of jobs for the State. A lower number means a smaller difference in distribution and is generally healthier, (i.e., closer to the distribution for the State as a whole).

Assessed Value Per Capita metric not applicable for Tribal lands; no property tax is levied.

The scores for each metric range from 5 (higher capacity) to 1 (lower capacity). The theoretical maximum score for a city is 65 (13 metrics times 5). For the Tribes the maximum is 60 because their dataset used only 12 metrics (the "assessed value per capita" is not applicable to tribal lands). Appendix O includes the raw data for the metrics.

At the bottom of **Table 3-195** are the combined total scores for all 13 metrics for each city and tribe and a comparison of the total to the theoretical maximum score, expressed as a percentage. For example, Drain's total score from all 13 metrics is 30, which is 46 percent of 65.

Interview Summary and Conclusions

Capacity

The community representatives had different perceptions of their capacity, depending on their circumstances and situations. Many of the interviewees felt that their communities are very challenged by today's economic environment; they do not feel they have recovered from the 2007 to 2009 recession. Examples include Coquille, the Coquille Indian Tribe, Gold Beach, Klamath Falls, Rogue River, and Winston. These communities tended to fall into two groups, those whose representatives regard the community as timber-dependent and those whose representatives regard their economies as heavily reliant on the tourism sector, which tends to be seasonal and dependent on the broader economy.

Few, if any community representatives admitted to having an excess of capacity. Indeed, almost every community representative spoke of community financial stresses, especially in light of Oregon's citizen-driven tax cap initiatives that limit cities' ability to raise revenue. Many community representatives spoke of the impact of the reductions in timber payments to the counties, which have resulted in the counties reducing or cutting off funds to the cities.

On the other hand, several community representatives spoke of their strong human capacity, which is the willingness and eagerness of their residents to pitch in to benefit and support community life, especially in hard times. Examples include Coquille and Junction City. One counter case is St. Helens, whose representatives cited a loss of social cohesion, as they estimated 75 percent of the City's labor force now commutes to jobs in Portland and Hillsboro.

Resiliency

Community representatives had a range of perceptions regarding their resiliency. Some representatives felt their communities are at a "tipping point" or crossroads with respect to their survival as communities with the capacity to meet their needs and obligations fully. The Grants Pass representatives used this actual "tipping point" phrase, but others expressing similar feelings included those from Coquille, the Coquille Indian Tribe, Drain, Gold Beach, Klamath Falls, Rogue River, and Winston.

These representatives feel their communities have low resiliency. To a varying extent, they see their communities as victims of a combined set of circumstances that has hit them hard:

- Decline of the timber industry and the resulting loss of "family wage" jobs (the jobs that have replaced timber-related jobs pay less)
- Decline in payments to counties that have resulted in reductions in pass through funds to cities
- A broader economy that, for some, has not recovered from the 2007 to 2009 recession
- Lack of economic options. This varies by community but particularly affects geographically more isolated communities (Coquille Indian Tribe, Gold Beach, Klamath Falls) and smaller, timber-dependent communities where the ebbs and flows in timber-related employment have major

direct and ripple impacts on the community (Coquille, Drain, Rogue River, Winston). The Coquille representative, for example, estimated that 30 to 50 percent of all jobs are at the City's one remaining mill.

- Broad political-economic shifts that favor Oregon's larger cities and metropolitan areas at the expense of western Oregon's rural areas. Smaller communities' representatives feel that they just can't compete.
- Some community representatives feel that decision-making and related lawsuits, especially at the Federal level, are unbalanced; they overly favor environmental interests and considerations compared to local economic interests, (e.g., Drain, Klamath Falls, Sublimity). Some representatives feel that what they perceive as overly protective environmental regulations deny them the tools to adapt economically.
- Demographic shifts, especially loss of school age children (Coquille, Drain, Rogue River, Winston), which is the result of the loss of jobs that support families, and, in some communities, an aging population.

Representatives of both coastal communities (e.g., Florence, Gold Beach) and some interior communities (e.g., Klamath Falls, Rogue River) described their communities as experiencing influxes of retirees.[80] Further, the general feeling among these representatives was that their retirees are not particularly beneficial fiscally or economically, unlike for communities that attract retirees that are more affluent.

Some community representatives (Coquille, Gold Beach, and Klamath Falls) described divisions among their residents in reaction to these circumstances. They described some groups as seeing the potential for a timber-based economy to come back, while others think that it is not coming back and that their communities need to adapt to the "new normal." The representatives pointed out that these divisions make it difficult to set future-oriented community policy.

Most of the community representatives described their efforts to adapt to their new situation, notwithstanding the challenges described above.

- Some communities have been able to "move on" by diversifying their economies, e.g., Junction City, Sublimity.
- Others are trying to diversify their economies, e.g., Coquille Indian Tribe, Florence, Grand Ronde, Grants Pass, and Klamath Falls.
- Several smaller community representatives described how challenging it is for them to diversify, e.g., Coquille, Gold Beach, Klamath Falls, and Rogue River.
- Other community representatives said they were less tied to the natural-resource economy in the first place, e.g., Lincoln City.
- Two of the communities, St. Helens and Molalla, are near the Portland and Salem metropolitan areas, and their representatives pointed out that much of their labor forces now commute to these areas.

[80] The BLM speculates that the lower cost of living in smaller communities may attract some retirees, though some communities also cited Oregon's high quality of life.

BLM Influences on Capacity and Resiliency

The interior communities in the southern part of the planning area (Coquille Indian Tribe, Drain, Grants Pass, Rogue River, Winston) tended to perceive more direct effects from the BLM compared to the other communities. However, nearly all the communities feel that BLM affects them in two ways: BLM's management impacts on the broader economy; and its impacts on the counties, which they feel ripple through to the communities. The Grants Pass interviewees said that cities were "joined at the hip" with the counties. The Coquille Indian Tribe interviewees spoke of the BLM's impact on the tribe in three ways: direct effects on the Coos County economy, indirect economic effects on the tribal members who are spread across five counties, and direct effects on the Tribe due to its legal mandate to manage its forest consistent with BLM's management practices. The Tribe specifically wants to decouple management of the Coquille Forest from BLM management practices.

With respect to the BLM's impacts, the way the BLM manages timber is by far the number one issue of concern among the communities. The primary concern is economic. The community representatives share a common view that the BLM is party to a worldview that no longer allows for economic use of a (timber) resource that is abundant and renewable. In their view, the BLM is not managing the resource for the benefit of local communities, and, in consequence, they experience the effects of millions of dollars of potential income that are lost every year. A few of the communities (Drain, Sublimity) referred to the O&C Act of 1937 in making these points.

In this view, expressed most strongly by representatives of the more timber-dependent communities, the loss of income has hurt them economically and fiscally. The economic effects described by these representatives include the loss of family wage jobs, and the high poverty rates and demographic changes (fewer families with school age children, more elderly and retirees) that they see as resulting in communities failing to sustain local business and community activity. They also described reductions in services the counties provide (sheriff, courts, libraries, jail, health and social services, and juvenile services) and reductions in pass-through funds from the counties (for street repairs and upgrades). Several representatives (Coquille, Coquille Indian Tribe, Grand Ronde, Winston) spoke of the negative impacts from cuts in funding for schools that affect their residents and Tribal members.

Fire is another major management issue for the communities, including the perceived lack of timber management that some interviewees believe has led to increases in fires. The Grants Pass representatives felt very strongly about this, citing large fires in 2013 (such as the 75,000-acre Big Windy fire) that effectively shut down the city, causing economic losses, heat, human health effects, and negative reputational impacts. From the community representatives' perspectives, the cost of fighting forest fires is huge, affecting State budgets and subsequently affecting counties and cities as the State directs resources away from other priorities.

Several representatives (Coquille, Grants Pass, Klamath Falls, Rogue River, Sublimity, Winston) felt that fewer managers and loggers in the forest and the steep decline in harvest since the 1990s have resulted in forests that are overgrown and more susceptible to damaging fires. They add that reduced or blocked access due to lack of management makes fighting the fires more difficult.

A few of the communities mentioned nearby BLM-managed recreation or had management concerns for specific sites (Coquille, Florence, Gold Beach, Rogue River, Winston). However, representatives of most communities did not describe BLM-provided recreation as a major factor affecting their community, and only a few places (e.g., Grants Pass), perceive it as important to local economies. A few communities cited lack of access and increasingly reduced access to the forest as reducing or limiting recreational activity, including hunting. The Grand Ronde representative specifically expressed disappointment over declining opportunities to hunt deer and elk, fewer openings and meadows due to lack of active management.

Some communities spoke of the BLM's role in supporting both local, resident-based recreation and the region's broader efforts to attract visitors (e.g., Gold Beach, Klamath Falls, and Lincoln City). However, some expressed the view that recreation/tourism were poor substitutes for local, resource-based jobs that provide family-wage salaries.

Representatives did not mention BLM management of other resources, such as grazing, minerals, fisheries, or cultural resources.as factors affecting communities, except in site-specific circumstances. The tribes expressed a broader interest in these management practices, since their interests range over multiple counties.

Capacity and Resiliency Summary

The total scores from the capacity and resiliency data baseline are fairly close, but there are differences. For example, the total percentage point spread was 23 points among the cities and 18 points among the tribes (**Table 3-196**). While strong data trends are a little difficult to discern, with the data from some metrics at variance with other data, it is possible to make the following overall observations:

- Cities in the northern part of the planning area generally have higher capacity and resiliency scores.
- Cities in the southern part of the planning area generally have lower capacity and resiliency scores.
- Grants Pass is a notable exception, its higher score driven by population, income, and employment metrics.
- Cities on the coast generally have lower capacity and resiliency scores. Gold Beach is a notable exception, its higher score driven by population, income, and recreation metrics.
- While there were few larger cities in the sample (only 3 of 13 are >10,000 population), they tended to have higher scores, though Klamath Falls had a lower score.
- Data limitations and historical/cultural considerations make it difficult to assign capacity and resiliency scores to the tribes.

There are no hard and fast rules to distinguish between different levels of capacity and resiliency, but distinguishing among communities is useful for assessing the impacts of the alternatives. **Table 3-196** recognizes four capacity and resiliency categories based on the data score spread; high, medium, low and very low - see the categories and ranges in the columns 1 and 2 and assignments in column 3.[81]

[81] This grouping of communities based on resiliency scores is consistent with other analyses of the effects of public land management, for example: Harris *et al*. 2000, op. cit.

Table 3-196. Capacity and resiliency data summary.

1	2	3
Capacity and Resiliency Category	**Percent of Maximum Data Score**	**Category Based on Data Score Alone**
High	>65%	Grants Pass Sublimity
Medium	60 – 64%	Gold Beach Molalla St. Helens
Low	50 – 59%	Coquille Florence Junction City Klamath Falls Rogue River Winston
Very Low	<50%	Drain Lincoln City

Note: due to data limitations the table does not include the scores of the tribes (see Analytical Methods).

Figure 3-151 shows the final assignments including adjustments to the scores in **Table 3-196** based on the insights from the interviews. The figure includes overlapping categories recognizing that capacity and resiliency are concepts that encompass a wide range of contributory factors on which communities may be variously stronger or weaker.

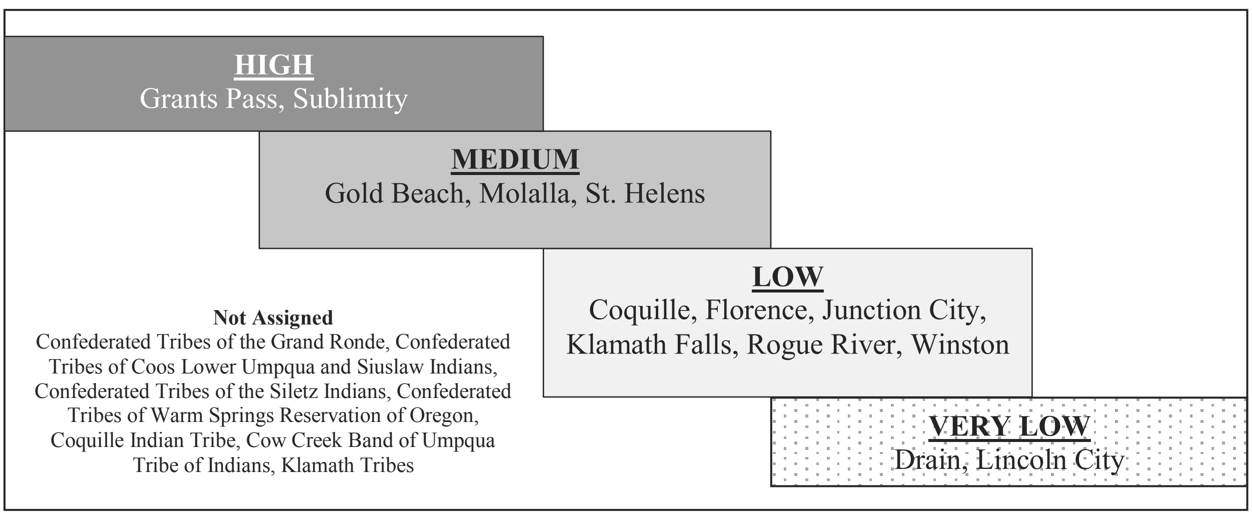


Figure 3-151. Capacity and resiliency affected environment summary.

Environmental Effects

BLM management affects local communities in two primary ways: 1) its effects on local economies, especially jobs and the associated earnings that result in spending in the communities; and, 2) its effects on county payments that affect the services the counties provide in communities, and in some cases, funds that counties pass through to communities.

Employment

Under the No Action alternative and under Alternative C, BLM-based employment (i.e., the number of jobs resulting from BLM activities and programs), would increase in every BLM district model area

(**Table 3-196**). This job growth would increase capacity and resiliency in local communities across the planning area. **Table 3-197** shows change in BLM-based employment by district model area. **Table 3-198** shows the effects of this change on the 13 selected cities.

Table 3-197. Change in BLM-based employment by district model area by alternative.

District Model Area	Number of Jobs in 2012	Percent Change in BLM-Based Total Employment by BLM District Economic Model Area					Number of Communities by Capacity-Resiliency Category
		No Action	Alt. A	Alt. B	Alt. C	Alt. D	
Coos Bay	1,198	3%	**-24%**	**-22%**	34%	**-48%**	Low[2]
Eugene	1,297	72%	41%	70%	158%	19%	Medium[1], Low[1]
Klamath Falls	231	25%	**-5%**	17%	29%	**-18%**	Low[1]
Medford	1,326	102%	27%	59%	75%	10%	High[1], Very Low[1]
Roseburg	1,225	40%	**-12%**	5%	58%	**-20%**	Low[1], Very Low[1]
Salem-Other	851	4%	9%	22%	60%	**-3%**	Low[1]
Salem-Portland MSA	1,275	0.1%	5%	9%	22%	1%	High[1], Medium[2]
Totals	7,403	39%	8%	25%	68%	**-7%**	

Notes:
1. Jobs in 2012 are the "current modified" jobs from **Table 3-185**.
2. Shaded cells under the alternatives mean a 20 percent or greater increase in the number of jobs compared to current. Bold underlined numbers mean a 20 percent or greater decrease in the number of jobs. Bold, no underline means a decrease in the number of jobs of less than 20 percent.
3. Number of Communities by Capacity-Resiliency Category is from **Table 3-196**.
Source: BLM, based on employment modelling in Issue 2.

Table 3-198. Effects of change in BLM-based employment by community.

Community	Capacity Resiliency Category	District	County	Effect on Community by Alternative (See Table Note for Explanation)				
				No Action	Alt. A	Alt. B	Alt. C	Alt. D
Grants Pass	High	Medford	Josephine	+++	++	+++	+++	+
Sublimity	High	Salem	Marion		+	++	+++	
Junction City	Medium	Eugene	Lane	+++	++	+++	+++	+
Molalla	Medium	Salem	Clackamas			+	++	
St. Helens	Medium	Salem	Columbia		+	++	+++	
Coquille	Low	Coos Bay	Coos		--	--	++	--
Florence	Low	Eugene	Lane	+++	++	+++	+++	+
Gold Beach	Low	Coos Bay	Curry		--	--	++	--
Klamath Falls	Low	Klamath Falls	Klamath	++		+	++	-
Lincoln City	Low	Salem	Lincoln		+	++	+++	
Winston	Low	Roseburg	Douglas	++	-		+++	-
Drain	Very Low	Roseburg	Douglas	++	-		+++	-
Rogue River	Very Low	Medford	Jackson	+++	++	+++	+++	+

Notes: All symbology refers to change in BLM-based employment in relation to "current modified" jobs from **Table 3-185**.
+ = minor benefit (6% to 20% increase);
++ = moderate benefit (21% to 50% increase);
+++ = strong benefit (>51% increase);
- = minor negative impact (6% to 20% decrease);
-- = moderate negative impact (21% to 50% decrease);
--- = strong negative impact (>51% decrease).
Blank cell indicates little or no effect (+5% to -5% change).

Under the No Action alternative, the highest percentage employment increases would be in the Medford, Eugene, and Roseburg districts. This would benefit communities across all capacity and resiliency categories in these districts (such as Grants Pass, Florence, and Winston) but would have little or no effect on communities in other districts, including several communities with low capacity and resiliency such as Coquille and Gold Beach.

Under Alternative C, the highest percentage increases would be in the Medford, Eugene, Roseburg, and Salem-Other districts. These districts all have communities with medium, low, and very low capacity and resiliency. However, as shown in **Table 3-198**, all communities would see moderate or strong benefits under this alternative.

Alternatives A, B, and D would have mixed effects, increasing or decreasing community capacity and resiliency in different geographies (**Table 3-197**). Under Alternative A, the Coos Bay and Roseburg Districts and the Klamath Falls Field Office would see job losses. These districts contain communities with low or very low capacity and resiliency including Coquille, Gold Beach, Winston, and Drain. The Eugene and Medford Districts would see the highest job increases under Alternative A, but these districts have more of a mix of higher and lower capacity/resiliency communities compared to the districts that would see job losses.

Under Alternative B, only the Coos Bay District would lose jobs. This would have negative economic effects on the District's low capacity/resiliency communities, such as Gold Beach and Coquille. The other districts, especially Eugene and Medford, would see job increases and the communities within these districts, such as Grants Pass and Roque River, would see modest to strong benefits.

Under Alternative D, all district model areas except Salem-Portland MSA, Eugene, and Medford would see job losses. The highest percentage losses would be in the Coos Bay and Roseburg Districts both of which contain low and very low capacity/resiliency communities.

County Payments

For purposes of the effects analysis, the BLM assumed that the Federal Government would make payments to counties using the formula in the O&C Act (see Socioeconomics Issue 3). Under the distribution formula, the counties in the Medford, Roseburg and Salem districts would receive 73 percent of the total payments (**Table 3-199**).

Table 3-199. Shares of county payments by BLM district

District/Field Office	Sum of County Percentages
Coos Bay	10
Eugene	15
Klamath Falls	2
Medford	28
Roseburg	25
Salem	20

Source: **Table 3-190**

Table 3-200 shows what the payments would be in 2018 by district using the payments to counties data and the distribution formula from **Tables 3-190** and **3-192**. **Table 3-201** shows the potential effects of these payments on the 13 selected cities.

Table 3-200. County payments by district by alternative.

District/ Field Office	2012 Payment Under O&C Act Formula[1]	Payments by Alternative in 2018 (2012$)				
		No Action	Alt. A	Alt. B	Alt. C	Alt. D
Coos Bay	$1,117,223	$4,441,647	$2,685,209	$3,479,049	$6,440,522	$1,786,198
Eugene	$1,786,387	$7,101,984	$4,293,522	$5,562,836	$10,298,091	$2,856,046
Klamath Falls	$273,749	$1,088,320	$657,946	$852,458	$1,578,096	$437,665
Medford	$3,246,381	$12,906,356	$7,802,570	$10,109,279	$18,714,606	$5,190,261
Roseburg	$2,930,517	$11,650,603	$7,043,401	$9,125,674	$16,893,725	$4,685,263
Salem	$2,344,415	$9,320,482	$5,634,721	$7,300,539	$13,514,980	$3,748,210
Totals	**$11,698,672**	**$46,509,392**	**$28,117,370**	**$36,429,835**	**$67,440,021**	**$18,703,644**

[1] Estimated O&C payments in 2012, had county payments been based on the O&C formula that year (see discussion in Issue 3).

Table 3-201. Potential effects of county payments by community.

Community	Capacity Resiliency Category	County	Share of County Payments to Each County[1]	Effects by Alternative (See Table Note for Explanation)				
				No Action	Alt. A	Alt. B	Alt. C	Alt. D
Grants Pass	High	Josephine	12.1%	+++	+	++	+++	+
Sublimity	High	Marion	1.5%	+			+	
Junction City	Medium	Lane	15.3%	+++	++	++	+++	+
Molalla	Medium	Clackamas	5.6%	+	+	+	++	
St. Helens	Medium	Columbia	2.1%	+		+	+	
Coquille	Low	Coos	5.9%	++	+	+	++	
Florence	Low	Lane	15.3%	+++	++	++	+++	+
Gold Beach	Low	Curry	3.7%	+	+	+	++	
Klamath Falls	Low	Klamath	2.3%	+		+	++	
Lincoln City	Low	Lincoln	0.4%			+		
Winston	Low	Douglas	25.1%	+++	+++	+++	+++	+
Drain	Very Low	Douglas	25.1%	+++	+++	+++	+++	+
Rogue River	Very Low	Jackson	15.7%	+++	++	++	+++	+

[1] Under the O&C Act distribution formula. See **Table 3-190**.
\+ = small benefit ($0.5 million to $2.0 million);
++ = moderate benefit ($2.0 million to $4.0 million);
+++ = strong benefit (>$4.0 million).
Blank cell indicates little or no effect (<$0.5 million).

Payments to counties would increase under all alternatives, relative to what the payments would have been in 2012 under the O&C Act formula. Driven by timber harvest volumes, payments would be highest under Alternative C, followed by the No Action alternative. See the discussion in Issue 3.

Relative to current population, the formula generally benefits the offices with smaller populations. For example, counties in the Salem District, with approximately 74 percent of the planning area population, receive approximately 20 percent of the payments. This would limit beneficial effects to lower capacity resiliency communities in the Salem District such as Lincoln City. Roseburg, with approximately 3 percent of the planning area population, receives 25 percent. As noted under methods, the BLM assumed continuation of the current distribution formula.

The payments would benefit the offices with low capacity/resiliency communities especially in the Coos Bay, Medford, Roseburg, and Eugene Districts. Examples would include Coquille, Drain, Florence, and Winston. Klamath Falls would see some benefits, but since Klamath County receives only 2 percent of total receipts, the benefits would be small.

Under the alternatives where employment and earnings would fall in some offices, (i.e., Alternatives A, B, and D), the loss of total BLM-based earnings would be greater than the earnings from the county payments. The economic impact of earnings losses to communities with low capacity and resiliency would be substantial.[82]

[82] For example, under Alternative A, Coos Bay would see a net loss in worker earnings of approximately $13.8 million ($54.4 million minus $39.1 million = $15.3 million (**Table 3-185**), $15.3 million minus $1.5 million =$13.8 million (**Appendix O, Table O-6**).

Issue 6

Would the alternatives result in environmental justice impacts (disproportionally high and adverse effects on minority, low-income, or Tribal populations or communities)?

Summary of Analytical Methods

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* (1994) requires analyses of Federal actions to address human health and environmental conditions in minority and low-income communities, and to ensure that disproportionately high and adverse human health or environmental effects on these communities are identified and addressed.

Environmental justice refers to the "fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (EPA 2007). In the context of the RMPs for Western Oregon, a potential environmental justice population is one that could experience disproportionately high and adverse human health or environmental effects from the implementation of an RMP.

To identify potential environmental justice populations, the BLM collected the most recently available population and income data for populations in the following 284 geographies in the planning area:

- 19 counties
- 161 incorporated places (i.e., cities)[83]
- 97 census-designated places (CDPs)[84]
- 7 Federally-recognized Tribes with reservation and off-reservation trust land

The BLM also collected data for the State of Oregon. The State data serve as the reference for determining which local geographies contain potential environmental justice populations.

The BLM collected the population and income data from the American Community Survey (ACS). The ACS is an ongoing survey by the U.S. Census Bureau that provides data every year and provides more recent and more detailed data compared to the decennial census. The ACS gets data from a sample of the population. As a result, the data have statistical margins of error. The margins of error vary across the geography sampled with the data from smaller places generally having greater margins of error than larger places.[85] In addition, the ACS compiles data from multiple years; the data in this analysis are from 2009 to 2012.

To identify potential environmental justice populations the BLM used the following criteria, based on guidance from the Council on Environmental Quality for addressing environmental justice (CEQ 1997):

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[83] Three of these 161 places, Bonanza, Butte Falls, and Waterloo are towns not cities, but for simplicity of presentation this analysis counts them as cities.
[84] Census Designated Places are settled concentrations of population that identifiable by name but are not legally incorporated under the laws of the state in which they are located. State and local officials and the Census Bureau delineate CDPs cooperatively.
[85] See the US Census Bureau website (http://www.census.gov) for more information about the ACS, sampling, and margin of error.

1. Geographies where the minority or Hispanic population exceeds 50 percent of the total population.
2. Geographies where the minority or Hispanic population is "meaningfully greater" than the statewide minority or Hispanic population percentage. This analysis defines meaningfully greater as a minority or Hispanic population percentage that is 25 percent or higher than the statewide percentage.
3. Geographies where the percentage of the population in poverty is meaningfully greater than the statewide percentage. This analysis defines meaningfully greater as a poverty population percentage that is 25 percent or higher than the statewide percentage.
4. Geographies where the percentage of the population with low income is meaningfully greater than the statewide percentage.

Minority populations include individuals that belong to one or more of the following races: African-American, American Indian, Alaska Native, Asian, Native Hawaiian, other Pacific Islander, Other race, or Multiple Races. For this analysis, the BLM summed the separate minority populations to calculate a total minority population for each geography. Minority individuals also include those identifying as Hispanic or Latino, regardless of race and the BLM conducted a separate Hispanic or Latino population analysis.[86]

The population in poverty criterion uses data from the ACS that identifies persons as below poverty level if that individual's income, or family's total income, is below a pre-defined threshold (U.S. Census Bureau 2014a).[87] This analysis defines low-income as the percentage of the households whose income is 50 percent or less than the state median household income. For criteria 2, 3, and 4 above, this analysis defines "meaningfully greater" as a population percentage that is 25 percent or more higher than the statewide percentage.

The regional scale of this planning effort and the geographical breadth of its potential impacts is such that it is not possible to analyze with useful precision how the different RMP alternatives would affect one specific geography below the county level, such as a city or CDP versus another. Instead, the analysis assumed that positive or negative effects to regions and counties will have similar effects on the local geographies within those regions and counties.

The first step in the effects analysis was to identify any negative effects that would result from implementation of the RMPs under each alternative, and then to assess whether they would fall disproportionately on minority or low-income populations. Views of what constitutes a negative or positive impact vary depending on different perspectives and values, but this analysis assumed that increases in BLM-based employment, and the increase in earnings that would result, would be positive impacts, and that decreases in employment would be negative. Similarly, this analysis assumed that increases in payments to counties would be a positive impact, and decreases in payments to counties would negative. The effects analysis section addresses these two types of effects on identified environmental justice populations.

The alternatives could affect environmental justice populations in other ways. For example, dependence on a resource or use, such as access to recreation or to grazing, that the alternatives would allocate or manage differently could lead to positive or negative impacts. However, such impacts would not likely

[86] The U.S. Census Bureau defines race (African-American, Asian, etc.) separately from ethnicity (Hispanic or Non-Hispanic).
[87] Each person or family is assigned one out of 48 possible poverty thresholds that vary by size of the family and ages of the members. For example the 2013 threshold for a family of four with two children under 18 was $23,624.

result in disproportionally high and adverse effects, and the locally specific data necessary to assess such impacts at a landscape level are beyond the scope of this analysis.

The Planning Criteria provide additional detail regarding the Analytical Methods (USDI BLM 2014 pp. 149-151).

Background

Table 3-202 presents racial minority and Hispanic data for the counties in the planning area for 2000 and 2012. As of 2012, the minority population of the planning area as a whole was approximately 520,000 or 17 percent of the total population, slightly higher than the minority percentage for the State of Oregon (15 percent). Since 2000, when the planning area's minority population was 14 percent, the minority population has increased by 26 percent, though four counties, all in the Salem District, had minority growth rate increases above 40 percent (Linn, Polk, Washington, and Yamhill).

Table 3-202. Racial minority and Hispanic population change, 2000 to 2012.

Geography	2012				2000				Change 2000 to 2012			
	All Minorities		Hispanic		All Minorities		Hispanic		All Minorities		Hispanic	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Oregon	563,921	15%	449,888	12%	459,776	13%	275,314	8%	104,145	23%	174,574	46%
Planning Area	519,755	17%	387,563	11%	411,827	14%	234,876	8%	107,928	26%	152,687	65%
Benton Co.	10,104	12%	5,486	6%	8,475	11%	3,645	5%	1,629	19%	1,841	38%
Clackamas Co.	38,017	10%	29,137	8%	29,539	9%	16,744	5%	8,478	29%	12,393	56%
Clatsop Co.	3,110	8%	2,820	8%	2,445	7%	1,597	4%	665	27%	1,223	70%
Columbia Co.	3,405	7%	2,035	4%	2,430	6%	1,093	3%	975	40%	942	64%
Coos Co.	5,937	9%	3,456	5%	5,039	8%	2,133	3%	898	18%	1,323	62%
Curry Co.	1,686	8%	1,258	6%	1,503	7%	761	4%	183	12%	497	56%
Douglas Co.	7,261	7%	5,042	5%	6,165	6%	3,283	3%	1,096	18%	1,759	44%
Jackson Co.	16,334	8%	21,894	11%	15,144	8%	12,126	7%	1,190	8%	9,768	61%
Josephine Co.	4,969	6%	5,274	6%	4,623	6%	3,229	4%	346	7%	2,045	50%
Klamath Co.	7,945	12%	6,990	11%	8,080	13%	4,961	8%	-135	-2%	2,029	35%
Lane Co.	37,680	11%	26,125	7%	30,231	9%	14,874	5%	7,449	25%	11,251	61%
Lincoln Co.	5,326	12%	3,662	8%	4,187	9%	2,119	5%	1,139	27%	1,543	67%
Linn Co.	9,901	8%	9,097	8%	7,010	7%	4,514	4%	2,891	41%	4,583	78%
Marion Co.	61,715	20%	76,429	24%	52,365	18%	48,714	17%	9,350	18%	27,715	42%
Multnomah Co.	158,601	22%	79,791	11%	137,661	21%	49,607	8%	20,940	15%	30,184	44%
Polk Co.	9,316	12%	9,122	12%	6,741	11%	5,480	9%	2,575	38%	3,642	38%
Tillamook Co.	1,838	7%	2,262	9%	1,490	6%	1,244	5%	348	23%	1,018	75%
Washington Co.	122,803	23%	83,085	16%	79,335	18%	49,735	11%	43,468	55%	33,350	40%
Yamhill Co.	13,807	14%	14,598	15%	9,364	11%	9,017	11%	4,443	47%	5,581	39%

Sources:
U.S. Census Bureau; American Community Survey, Profile of General Demographic Characteristics: 2000 Census 2000 Summary File 1 (SF 1), Table DP-1; American FactFinder; http://factfinder2.census.gov ; (Sept 2014).
U.S. Census Bureau; American Community Survey, 2012 American Community Survey 5-Year Estimates, Tables DP03, DP04, DP05, S1901 and S1701; American FactFinder; http://factfinder2.census.gov ; (July 2014).
Notes: Hispanic status is considered separately from racial identification.

The Hispanic population share of the planning area population was 11 percent in 2012, which was very close to the percentage for the State as a whole (12 percent). Since 2000 the planning area's Hispanic population increased by 65 percent. Nearly two-thirds of this increase was in three counties: Marion, Multnomah, and Washington.

The median household income in the planning area as whole in 2012 was $51,197, a little higher than the statewide median of $50,036 (**Table 3-203**). Household income varies considerably across the planning area. The lowest median incomes (below $40,000) are in the southwest, in Coos, Curry and Josephine counties, and the highest (above $55,000) in the north, in Clackamas, Columbia, and Washington counties. Between 2000 and 2012, the median household income increased in all counties in the planning area. For the planning area as whole, the increase of $8,955 was slightly lower than for the State of Oregon.

Table 3-203. Poverty population and median household income, 2000 and 2012.

Geography	2012		2000		Change 2000 to 2012	
	Population in Poverty	Median Household Income	Population in Poverty	Median Household Income	Population in Poverty	Median Household Income
Oregon	584,059	$50,036	388,740	$40,916	195,319	$9,120
Planning Area	515,861	$51,197	341,468	$42,242	174,393	$8,955
Benton Co.	17,418	$48,635	10,665	$41,897	6,753	$6,738
Clackamas Co.	36,265	$63,951	21,969	$52,080	14,296	$11,871
Clatsop Co.	5,725	$44,330	4,625	$36,301	1,100	$8,029
Columbia Co.	6,797	$55,358	3,910	$45,797	2,887	$9,561
Coos Co.	10,661	$37,853	9,257	$31,542	1,404	$6,311
Curry Co.	3,048	$38,401	2,554	$30,117	494	$8,284
Douglas Co.	18,777	$40,096	12,999	$33,223	5,778	$6,873
Jackson Co.	33,346	$43,664	22,269	$36,461	11,077	$7,203
Josephine Co.	16,301	$36,699	11,193	$31,229	5,108	$5,470
Klamath Co.	12,143	$41,066	10,515	$31,537	1,628	$9,529
Lane Co.	64,705	$42,628	45,423	$36,942	19,282	$5,686
Lincoln Co.	7,262	$41,996	6,084	$32,769	1,178	$9,227
Linn Co.	19,237	$47,129	11,618	$37,518	7,619	$9,611
Marion Co.	55,223	$46,654	37,104	$40,314	18,119	$6,340
Multnomah Co.	123,434	$51,582	81,711	$41,278	41,723	$10,304
Polk Co.	10,788	$52,365	6,943	$42,311	3,845	$10,054
Tillamook Co.	4,197	$41,869	2,718	$34,269	1,479	$7,600
Washington Co.	57,466	$64,375	32,575	$52,122	24,891	$12,253
Yamhill Co.	13,068	$53,950	7,336	$44,111	5,732	$9,839

Sources:
U.S. Census Bureau; American Community Survey, Profile of Selected Economic Characteristics: 2000 Census 2000 Summary File 3 (SF 3), Table DP-3; American FactFinder; http://factfinder2.census.gov ; (Sept 2014).
U.S. Census Bureau; American Community Survey, 2012 American Community Survey 5-Year Estimates, Tables DP03, DP04, DP05, S1901 and S1701; American FactFinder; http://factfinder2.census.gov ; (July 2014).

Affected Environment

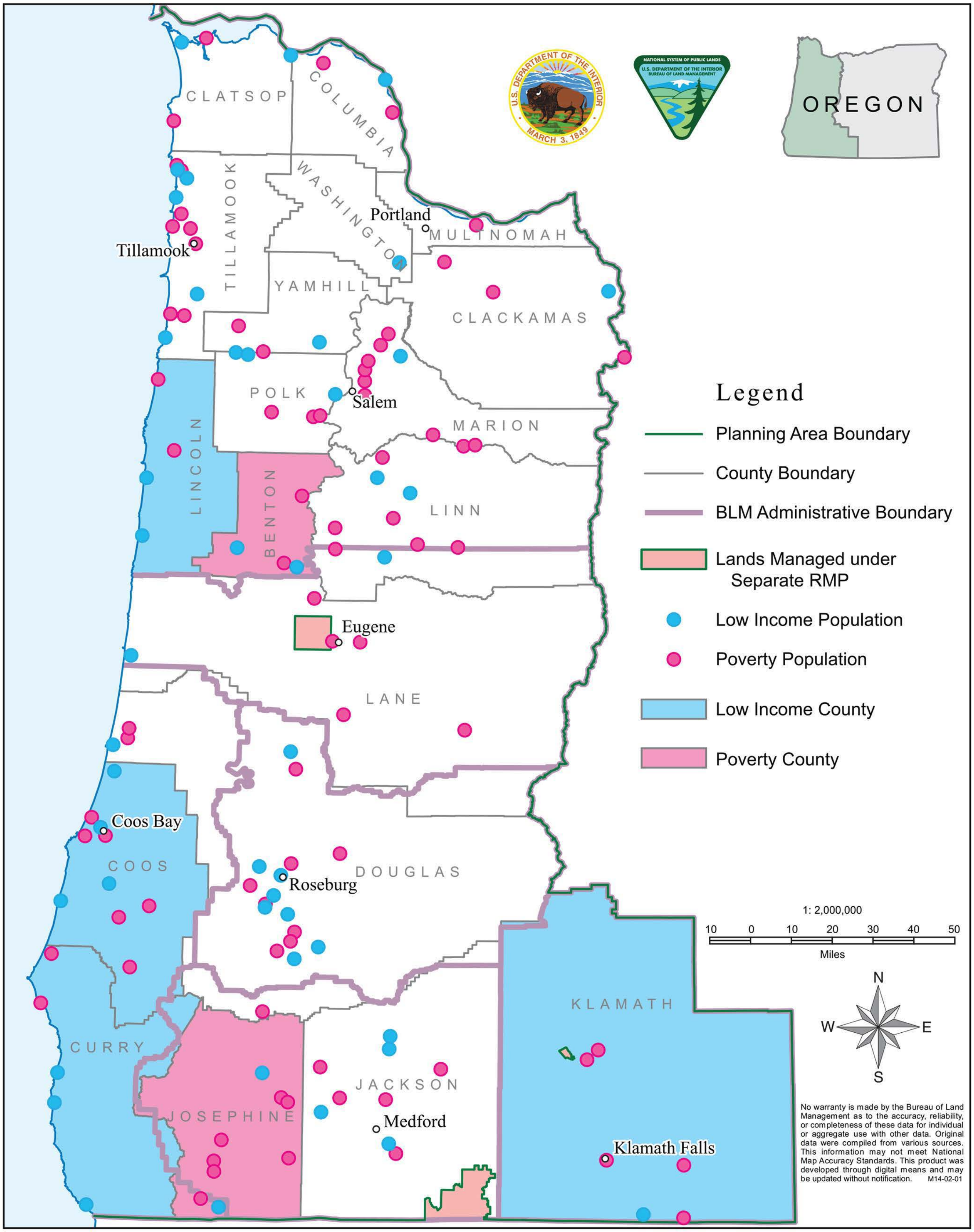
Minority Populations

Table 3-204 summarizes the data for minority populations in the planning area. **Map 3-8** shows their locations. Appendix O contains the data for all the minority population geographies in the planning area.

Table 3-204. Summary of minority populations meeting environmental justice criteria.

Geography	Number of Geographies					
	50 Percent Criterion		Additional Meaningfully Greater Criterion		Total, Both Criteria	
Counties	0		3		3	
Cities	5		29		34	
CDPs	2		19		21	
Tribes	6		0		6	
Totals	**13**		**51**		**64**	
Population	**Population**					
	Total	**Minority**	**Total**	**Minority**	**Total**	**Minority**
Counties			1,584,319	343,119	1,584,319	343,119
Cities	28,637	16,718	86,766	21,028	115,403	37,746
CDPs	261	146	15,286	4,457	15,547	4,603
Tribes	5,247	4,647			5,247	4,647
Totals	**34,145**	**21,511**	**1,686,371**	**368,604**	**1,720,516**	**390,115**

Sources: BLM staff compiled from: U.S. Census Bureau; American Community Survey, 2012, 2011, 2010, 2009. Appendix O contains more detailed source descriptions.
Notes: Population numbers for cities and CDPs do not include those cities in Marion, Multnomah, and Washington counties.



Map 3-8: Low Income and Poverty Populations and Counties within the Planning Area

50 Percent Criterion

Thirteen geographies meet the 50 percent criterion, (i.e., the racial minority or Hispanic population exceeds 50 percent of the total population). In total, these 13 geographies contain approximately 34,100 people, or approximately one percent of the total population of the planning area.

None of the 19 counties as a whole meets the 50 percent criterion.

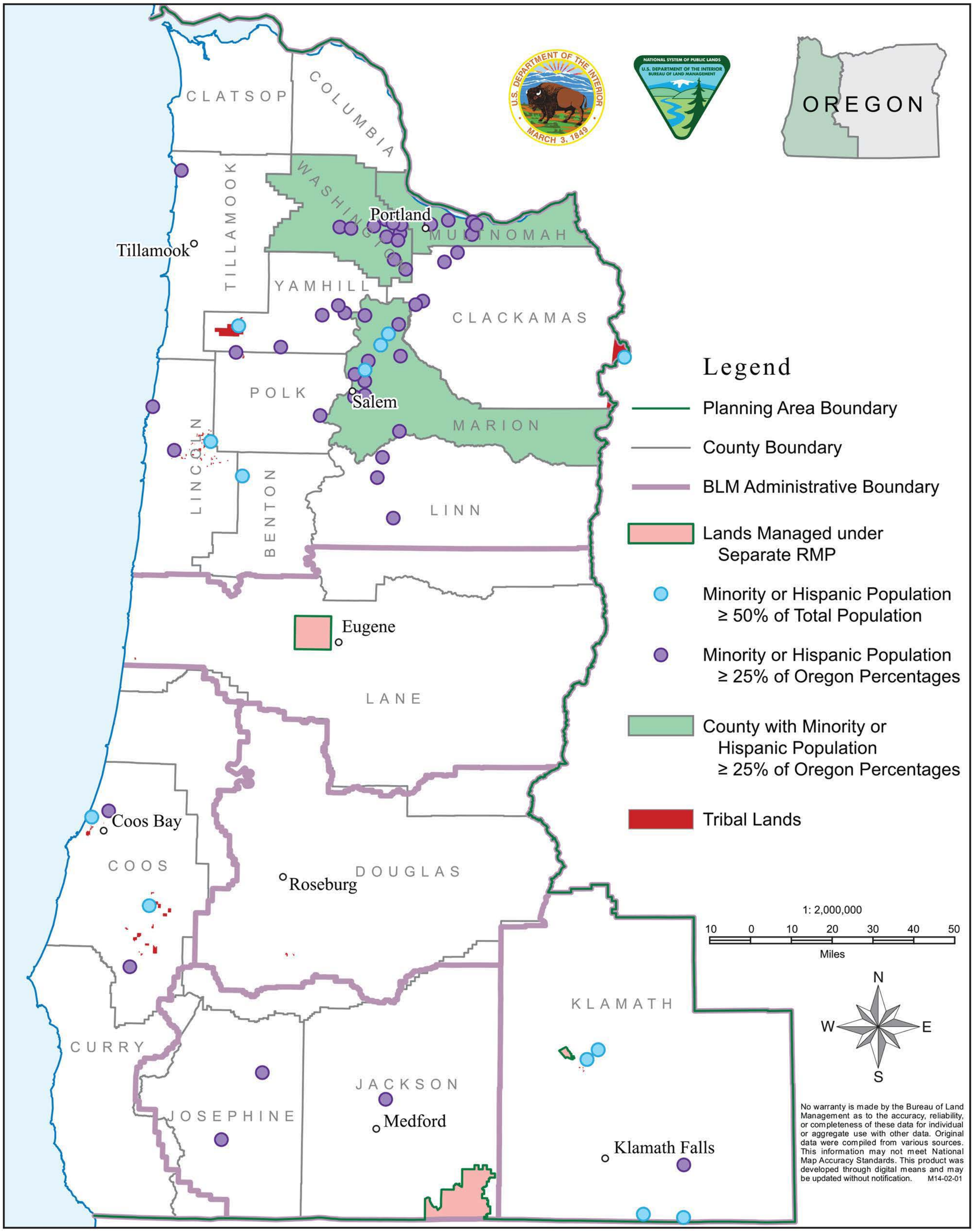
Six of the seven Tribal land areas meet the criterion. The only Tribe not meeting the criterion is the Cow Creek Band of Umpqua Tribe of Indians. Note that the data for the Tribes have limitations. First, as noted in the Summary of Analytical Methods for Issue 5, the ACS data are subject to sampling error, and, in addition, some of the Tribes have very small populations (e.g., less than 30 persons) living on Tribal lands thereby compounding the potential for error. Second, the population on reservation and off-reservation trust land is not the entire Tribal membership. Some of the Tribes commented on this as part of the capacity/resiliency analysis. The U.S. Census Bureau does not collect data for the entirety of a Tribe's members.

Seven other geographies meet the criterion: Summit CDP in Benton County; Chiloquin, Malin, and Merrill City in Klamath County; and Gervais, Woodburn, and Labish Village CDP in Marion County. Of these, five meet the criterion based on their Hispanic populations and three meet the criterion based on their non-Hispanic minority populations.[88]

Meaningfully Greater Criterion

A total of 51 geographies, in addition to the 13 above, meet the meaningfully greater criterion, (i.e., the minority or Hispanic population is 25 percent or higher than the statewide percentages). The statewide percentages are 15 percent minority and 12 percent Hispanic. These geographies include three counties, 29 cities, and 19 CDPs. The three counties are Marion, Multnomah, and Washington (**Table 3-204** and **Map 3-9**).

[88] Labish Village in Marion County meets the criterion based on both its Hispanic and non-Hispanic minority populations.



Map 3-9: Minority Populations and Counties within the Planning Area

Of the 48 cities and CDPs with meaningfully greater populations, 42 are in the Salem District, mostly along the I-5 corridor between Salem and Portland, and in the Portland metropolitan area itself.

Total, Both Criteria

The 64 geographies meet one or both of the criteria. These geographies contain approximately 1.72 million people, or approximately 50 percent of the total population of the planning area (approximately 3.4 million). Of the 1.72 million, approximately 390,000 are minority persons and approximately 199,000 are Hispanic (some of whom could also be non-Hispanic minority persons, such as Black Hispanics). The City of Portland, with a 22 percent minority population, accounts for approximately 586,000 of the 1.72 million, or 34 percent.

Low- Income Populations

Table 3-205 presents data for low-income populations in the planning area as of 2012. **Map 3-8** shows their locations. Appendix O contains the data for all the low-income population geographies in the planning area.

Table 3-205. Summary of low-income populations meeting environmental justice criteria.

Geography	Number of Geographies		
	Poverty	Additional Low Income	Totals
Counties	2	4	6
Cities	45	18	63
CDPs	31	16	47
Tribes	5	1	6
Totals	**83**	**39**	**122**
	Population		
Counties	33,719	17,249	50,968
Cities	84,977	7,688	92,665
CDPS	15,903	630	16,533
Tribes	1,281	5	1,286
Totals	**135,880**	**25,571**	**161,451**

Sources: BLM staff compiled from: U.S. Census Bureau; American Community Survey, 2012, 2011, 2010, 2009. Appendix O contains more detailed source descriptions.
Note: To avoid double counting, the populations for additional low- income geographies exclude the populations counted as poverty.

Poverty Criterion

A total of 83 geographies meet the poverty criterion, (i.e., the percentage of residents in poverty is 25 percent or higher than the statewide percentage, which is 15 percent). These geographies comprise 2 counties (Benton and Josephine), 45 cities, 31 CDPs, and 5 of the Tribes. The total population of these 83 geographies is approximately 992,000 (29 percent of the planning area population). The number of people in poverty within the 83 geographies is approximately 136,000.

The poverty populations are scattered throughout the planning area, and can be found in every county and BLM district (**Map 3-9**).

Low Income Criterion

Thirty-nine geographies meet the low-income criterion, (i.e., the percentage of residents with income 50 percent or less than the state median household income is 25 percent, which is higher than the statewide percentage at 24 percent).

These geographies are all in addition to the 83 geographies meeting the poverty criterion, and include 4 counties, 18 cities, 16 CDPs, and 1 Tribe. The four counties are Coos, Curry, Klamath, and Lincoln. The number of additional people with low income within these 39 geographies is approximately 25,600.

Environmental Effects

Minority Populations

The Affected Environment section identified three counties (Washington, Multnomah, and Marion) that met the environmental justice criteria because of their minority populations; these 3 counties also contained 31 of the 55 minority cities and CDPs that met environmental justice criteria. Altogether, the Salem District contained 43 of the 55 minority cities and CDPs plus 3 of the 7 tribal land areas. The other 12 minority populations are scattered across the Klamath Falls Field Office and the Coos Bay and Medford Districts.

To assess whether the alternatives would disproportionately affect minority communities negatively, the BLM assessed whether any of the alternatives would lead to disproportionately fewer BLM-based jobs or lower payments to counties in the Salem District compared to the other districts.

The Salem District would gain in employment under the No Action alternative as well as under Action Alternatives A, B, and C, so the impacts on employment would be beneficial (**Table 3-197**). Under Alternative D, employment would increase in the MSA portion of the Salem District but decrease by three percent in the "Other" (more rural) portion of the Salem District (**Table 3-197**). However, the decrease in employment under Alternative D would be much higher in the other three districts that would experience decreases in BLM-related employment (-20 percent in Roseburg, -48 percent in Coos Bay, and -18 percent in Klamath Falls). Therefore, the BLM concludes that there would be no disproportionately negative effects on employment in minority counties. However, minority populations in Coos Bay, Klamath Falls, and Roseburg could experience negative effects related to jobs.

The BLM also assessed whether there would be any disproportionately negative effects on minority populations due to changes in payments to counties under the alternatives. Under all alternatives, every county would receive higher payments under the O&C Act formula in both 2018 and 2028 than they would have received in 2012 under the O&C Act-based formula (**Table 3-192**). Therefore, there would be no disproportionately negative impacts because of changes in county payments.

Low-Income Populations

The Affected Environment section identified 116 geographies that met the low-income environmental justice criteria: 6 counties, 110 cities or CDPs, and 6 Tribes. Unlike the minority populations, which are concentrated in three counties, the low-income analysis showed that low-income populations are more spread out widely across the planning area, making the analysis of potential effects more complex (see **Maps 3-8** and **3-9**).

Some of the alternatives would result in reductions in BLM-based total employment (**Table 3-197**). Three offices would experience the largest decreases (12 to 48 percent): Roseburg, Coos Bay, and the Klamath Falls. Under Alternative A, employment would decrease in all three offices. Under Alternative B, employment would decrease in the Coos Bay District only, and, under Alternative D, employment would decrease in all three. Employment effects would be positive in all other offices under all alternatives with the exception of a relatively small 3 percent decrease in the rural part of the Salem District under Alternative D.

The counties within these three offices are Douglas, Coos, Curry, and Klamath. Three of these counties met the low-income environmental justice criteria, and the fourth (Douglas) was within 1 percent of the low-income threshold, and contained 14 cities or CDPs meeting the low-income environmental justice criteria.[89] In total, four of the six low-income counties in the planning area are in this southern part of the planning area.[90]

The BLM concludes that employment effects in Coos, Curry, Douglas, and Klamath Counties would be disproportionately negative under Alternatives A and D, with greater negative effects under Alternative D than under Alternative A. Low income cities, CDPs and tribes in these counties would also be vulnerable to these disproportionately negatively effects. Under Alternative B, employment effects would be disproportionately negative for Coos and Curry Counties, and low income cities, CDPs, and Tribes in these counties would also be vulnerable.

Regarding payments to counties, under all alternatives, every county would receive higher payments under the O&C Act formula in both 2018 and 2028 than they would have received in 2012 (**Table 3-192**). Therefore, there would be no disproportionately negative impacts as a result of changes in county payments. However, the BLM notes that under the alternatives where employment and earnings would fall in some districts, (i.e., Alternatives A, B, and D), the loss of total BLM-based earnings would be greater than the earnings from the County payments (see the discussion of county payments in Issue 5).

A key issue for the counties is how any increased payments would compare to payments under Secure Rural Schools funding (**Tables 3-188**, **3-189**, and **3-190**). Coos, Curry, Douglas, and Josephine are the counties most dependent on the SRS funding based on the high percentages of their general funds that the SRS payments represent (25 percent to 82 percent, **Table 3-189**). Three of these counties are low-income and the Douglas was within 1 percent of the low-income threshold. The State of Oregon Business Development Department considers all four counties as distressed (see the background section).

The future of the SRS program and distributions to counties are outside the control of the BLM and cannot be assessed in the alternatives. Nevertheless, the BLM notes that decreases in SRS funding since 2003 have disproportionately negatively affected these four counties (**Table 3-188**), and three of these counties would experience employment losses under some of the alternatives which could exacerbate their distressed financial condition.

Issue 7

What would be the cost to the BLM to implement the alternatives?

Summary of Analytical Methods

The BLM compiled budget information for FY 2012 for each of the five full BLM district offices in the planning area and for the Klamath Falls Field Office. The budget data did not include the cost of the BLM's Oregon State Office or of the fire program because the State Office budget is independent of the

[89] Of the 14, 3 are in western Douglas County in the Coos Bay District.
[90] The fourth is Josephine County (adjacent to Curry and Douglas) which met the criteria for a poverty county.

RMPs and the fire budget can fluctuate widely from year to year depending on the extent and scale of fires.

The BLM estimated the portions of the district offices' budgets that are attributable to the timber program under current conditions based on 2012 timber harvest volumes and an average timber volume cost of $200 per Mbf, a figure the state office uses for budget estimates. This figure includes all of the work associated with preparing, offering, and administering timber sales. It includes work done by members of a timber sale interdisciplinary team, National Environmental Policy Act compliance work, overhead, etc.

To estimate the potential cost to the BLM to implement the alternatives, the BLM applied the $200 per Mbf figure to the estimated timber harvest under the No Action alternative and the four action alternatives. The BLM estimated budgets based on projected harvests for the average of the first decade. The BLM added this figure to the non-timber portion of the budget, which the BLM assumed would remain unchanged between alternatives, consistent with the analytical assumptions set forth in the Planning Criteria. The total of the timber and non-timber portion of the budget resulted in a total BLM budget by alternative. All dollar figures are expressed in constant 2012 dollars.

Note that as a landscape-level planning effort, none of the alternatives prescribe project-level or site-specific activities on BLM-administered lands. Further, the BLM's selection of an alternative does not authorize funding to any specific project or activity nor does it directly tie into the agency's budget as appropriated annually through the Federal budget process. Consequently, the effects analysis does not cover non-timber resources even though these resources do have associated management costs.

Affected Environment

The BLM's budget for the six offices in the planning area totaled approximately $109.2 million in FY 2012, including labor and non-labor costs. The labor costs cover approximately 780 employees across all six offices (**Table 3-206**). The Medford office, which has the largest number of employees, accounts for approximately 30 percent of the total area-wide budget. Non-labor costs include items such as rent, transportation, and supplies, but the largest single component is contracts to non-BLM entities for a variety of services on BLM-administered lands.

Table 3-206. BLM budget by office, FY 2012.

District/ Field Office	Employees (FTE)	Expenditures		Totals	Programmatic Breakdown	
		Labor	Non-Labor		Timber	Non-Timber
Salem	150	$12,345,619	$9,213,051	$21,558,670	$12,430,000	$9,128,670
Eugene	130	$10,445,431	$7,544,410	$17,989,841	$7,215,800	$10,774,041
Roseburg	117	$9,414,710	$4,104,349	$13,519,059	$9,047,200	$4,471,859
Coos Bay	109	$9,084,127	$7,990,160	$17,074,287	$14,200,200	$2,874,087
Medford	231	$17,713,275	$15,503,893	$33,217,168	$4,705,200	$28,511,968
Klamath Falls	41	$2,891,236	$2,973,992	$5,865,228	$904,800	$4,960,428
Totals	**778**	**$61,894,398**	**$47,329,854**	**$109,224,252**	**$48,503,200**	**$60,721,052**
Totals (%)		**57%**	**43%**		**44%**	**56%**

Management of the BLM's timber program in FY 2012 accounted for an estimated $48.5 million, or 44 percent, of the total $109.2 million budget. The remaining 56 percent covered all other programs such as recreation, mining, fisheries, and grazing.

Environmental Effects

Table 3-207 shows the estimated effects on the BLM’s budget under the alternatives and the percent change compared to current conditions. All the alternatives except for Alternative D would result in an increase in the BLM’s budget compared to the current budget (i.e., approximately $109.2 million). Alternative C, with its higher projected timber harvests compared to current, would require the highest budget, approximately $171.7 million, a 57 percent increase compared to the budget under current conditions (FY 2012). The No Action alternative would result in a 29 percent increase compared to current. Alternative D, with its lower projected timber harvests would require a lower budget, approximately 11 percent below current.

Table 3-207. BLM budget by office under the alternatives (average of first decade).

District/ Field Office	No Action		Alt. A		Alt. B		Alt. C		Alt. D	
	Employees (FTE)	Budget	Employees (FTE)	Budget	Employees (FTE)	Budget	Employees (FTE)	Budget	Employees (FTE)	Budget
Coos Bay	106	$16,494,964	77	$11,977,873	79	$12,356,741	143	$22,298,462	47	$7,275,301
Eugene	206	$28,507,288	168	$23,334,122	197	$27,307,141	301	$41,748,002	144	$19,966,466
Klamath Falls	47	$6,623,809	39	$5,596,973	45	$6,375,177	49	$6,902,022	42	$5,988,014
Medford	316	$45,417,366	251	$36,045,992	278	$40,068,934	289	$41,636,426	238	$34,283,908
Roseburg	163	$18,922,846	88	$10,145,370	119	$13,827,249	190	$22,037,193	78	$8,989,792
Salem	172	$24,665,916	163	$23,343,606	189	$27,117,673	259	$37,097,407	141	$20,226,709
Totals	**1,009**	**$140,632,190**	**785**	**$110,443,935**	**908**	**$127,052,915**	**1,231**	**$171,719,511**	**690**	**$96,730,190**
Percent Change Compared to Current		**29%**		**1%**		**16%**		**57%**		**-11%**

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Soil Resources

Key Points

- The alternatives would increase the acreage of detrimental soil disturbance from timber harvest, road construction, and fuels treatments by 13 to 30 percent of current amounts during the first decade.
- The BLM would be able to reduce the acreage of detrimental soil conditions from timber harvest, road construction, and fuels treatments through sound management practices that would limit initial compaction levels, remove existing or created compacted surfaces, and improve soil water and organic matter levels.
- Detrimental soil disturbance from OHV use would be highest under the No Action alternative because none of the action alternatives would allocate any areas as open for OHV use.

Summary of Analytical Methods

Soil quality is the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support ecosystem health. Management practices can reduce soil quality through declines in two ecosystem properties - site organic matter and soil porosity (Powers *et al.* 1990).

In this analysis, the BLM evaluated reductions in soil quality based on acres of detrimental soil disturbance. The BLM evaluated the acres of detrimental soil disturbance from several sources of management-induced changes, and the cumulative total of all sources, as a decrease in the innate ability of a soil to function and provide ecosystem services. Detrimental soil disturbance is the limit where the innate soil properties change and the inherent capacity to sustain growth of vegetation is reduced (Powers *et al.* 1998). Detrimental soil disturbance generally represents unacceptable levels of erosion, loss of organic matter, soil compaction, soil displacement, lethal soil heating, or a combination.

Evaluating soil quality is complicated by the diversity of soil properties that drive the functional processes, appraisal techniques, and soil uses (Page-Dumroese *et al.* 2000). This analysis measured soil quality using acres of detrimental soil disturbance, rather than other measures, such as changes to soil quality index or site index, as discussed below.

Amacher *et al.* (2007) introduced the Forest Inventory and Analysis (FIA) program that measured a number of chemical and physical properties of soils in order to address specific questions about forest soil quality or health. This soil quality index integrated 19 measured physical and chemical properties of forest soils into a single number that could serve as the soil's "vital sign" of overall soil quality. The concept monitors changes in forest soil properties with time, but this index requires specific data that is not available at this scale of analysis across the decision area.

Site index class characterizes soil productivity by tree height growth over a set time. Across the decision area, there is a distinct differentiation between the high productivity soils in the north (predominately Site Class 2 and 3) and the lower productivity soils in the south (predominately Site Class 4 and 5). However, this traditional measure of soil productivity does not encompass the full spectrum of the functions that define soil quality, which requires a more holistic measure that defines growth as it relates to functional processes in the soil.

For several aspects of this analysis, the BLM categorized the decision area into the coastal/north (the Salem, Coos Bay, and Eugene Districts, and the northern portion of the Roseburg District) and the interior/south (southern portion of the Roseburg District, the Medford District, and the Klamath Falls Field Office). This division represents a general divide in forest productivity and soil conditions within the planning area.

Issue 1

How would timber harvest under the alternatives affect soil quality?

Summary of Analytical Methods

Timber harvest causes detrimental soil disturbance most often from displacement of surface material and soil compaction. The extent of detrimental soil disturbance varies with the type of yarding method and the mitigation measures employed.

The intensity, location, and extent of compaction differ under different yarding systems. In this analysis, the BLM assumed that determining the proper design measures to reduce or eliminate adverse effects could not be applied at this level of analysis. Therefore, the different yarding methods would result in detrimental soil disturbance of the following percentage within each harvest unit:

- Ground-based – 35 percent
- Cable – 12 percent
- Aerial – 6 percent
  (Heilman *et al.* 1981, Fleming *et al.* 2006, Froehlich 1976, Han *et al.* 2009, Miller *et al.* 1989).

Ground-based yarding systems have the greatest detrimental soil effect. Ground-based yarding equipment include, for example, rubber-tired skidders, tracked dozer equipment, cut-to-length harvesters, and multi-wheeled forwarders. The extent of an equipment's coverage across a harvest unit can vary from several well-spaced skid trails to operating over the entire harvest unit. Typically, only slope conditions that exceed machine capabilities prevent compaction from occurring because the equipment cannot operate on steeper slopes. In addition, repetitive tracking across the same trail causes the depth of compaction to go deep into the soil.

Cable yarding systems typically cause compaction at the landing area as well as within the harvest unit. Compacted areas stretch out like spokes from the landing, but are only as wide as sweeping tail end of a yarded log. Since there are many logs pulled to the landing along one yarding corridor, they create a compacted trail that ranges from 3 to 8 feet wide.

For aerial yarding, most compaction is in work areas adjacent to the harvest unit, and these areas generally undergo rehabilitation after harvest. Compaction from falling and yarding activities inside harvest units is typically negligible.

The BLM used data from the BLM Timber Sale Information System, which includes a listing for the type of yarding system employed during timber harvest, to provide information current levels of detrimental soil disturbance. The BLM used the final harvested acres from timber sale contracts from 1990 to 2012 to characterize current levels of detrimental soil disturbance. Using this 22 years of timber harvest data provides only a partial indication of the current amount of detrimental soil disturbance, because compaction from past harvesting may last more than 22 years. However, the BLM does not have sufficient information to quantify continuing detrimental soil disturbance from older timber harvests.

The Woodstock model provided outputs on acres of each yarding method by alternative for the first decade (the Vegetation Modeling section contains more information)

In this analysis, the BLM calculated the amount of detrimental soil disturbance from each timber harvest method by multiplying the areal extent of that yarding method for each alternative by the percentages listed above.

Background

Soil compaction occurs when soil particles are pressed together, reducing the pore space between them. This increases the weight of solids per unit volume of soil (bulk density). Soil compaction occurs in response to pressure from above (e.g., from animals or equipment). The risk for compaction is greatest when soils are wet (USDA NRCS 1996). Compaction is usually described as an increase in bulk density and results in plants increasing root strength in order to penetrate the soil for growth. Studies showing an increase of bulk density greater than 15 percent have varied impacts to plant growth depending on soil texture, plant species, and competing vegetation (Tan *et al.* 2009). Powers *et al.* (2005) found that soil compaction effects depended upon initial bulk density; vegetation growth declined on compacted clay soils but increased on sands.

In general, soil compaction that reduces water infiltration rates and large pore space for gas and water movement constitutes detrimental soil disturbance and can last many years (Froehlich and McNabb 1984, Cafferata 1992). Compaction restricts rooting depth, which reduces the uptake of water and nutrients by vegetation. Compaction decreases the soil pore size that can absorb water and decrease the soil temperature. Soil organisms respond to compaction by decreasing their soil organic matter decomposition, which then decreases their release of nutrients back into the soil. Smaller pore spaces decrease the infiltration of both water and air into a soil, and runoff increases with a corresponding increase of water erosion risk or hazard. The degree of soil compaction depends on the type of equipment used, number of equipment passes over the same location, and site conditions such as soil texture, water content, and temperature (Tan *et al.* 2009). Powers *et al.* (1990) hypothesized that the two most important site disturbances that reduce forest productivity are soil compaction and organic matter removal.

Soil compaction reduces tree growth, but the relationship between compaction and tree growth is complex and difficult to predict because it is dependent on many variables. For example, Miller *et al.* (1996) found early growth reductions of seedlings planted on compacted skid trails compared to uncompacted locations, but growth of most seedlings on compacted locations caught up to uncompacted locations after eight years. Tan *et al.* (2009) also found variable responses of three-year-old seedlings, depending on level of compaction, species, organic matter removal, and intensity of amelioration of compacted surfaces. Removing competition for site resources (e.g., water and nutrients) may offset severe compaction, and tree growth may not be affected (Sanchez *et al.* 2006).

A vast array of microbiotic organisms exist in the soil that can potentially be affected by detrimental soil disturbance. Most of these organisms are the decomposers of organic matter, which return nutrients to the soil for use by plant roots or other organisms. However, little research has been done on the effects of detrimental soil disturbance on microbiotic organisms other than the fungal and bacteria components. Most research on soil compaction in forests has focused on tree growth in skid trails or tree growth response after some amelioration treatment. Only recently did Shestak and Busse (2005) compare microbial composition, community size, activity, and diversity on compacted forest soils. They noted their results show tolerance or resilience by microbial communities. These authors suggest the reconfiguration of pores following compaction resulted in reduced total porosity and a near elimination of large pores, but an increase in habitable pore volume use by bacteria and fungi. Therefore, with the exception of poorly drained soils or for those regions receiving high annual precipitation where saturation is a concern, changes with compaction appear to be of little consequence to the microbial community. Previous studies have identified negative, neutral, or positive responses, yet there are few unifying concepts (Busse *et al.* 2006).

Ground-based yarding equipment has changed since the signing of the 1995 RMPs. Ground-based yarding equipment in use today are more mechanized, using fewer workers, and are capable of traversing more of each harvest unit. Soil compaction is a common consequence of using mechanized equipment, especially when soil moisture is high, for particular soil types. At high soil moisture content, cut-to-length and whole-tree harvesting cause a greater degree of soil compaction in skid trails. The cut-to-length system causes less compaction in the center of the trail, especially when operators minimize compaction by placing heavy slash loads on forwarding trails before traversing a unit. Whole-tree harvesting disturbs a larger area, sweeping slash from trails, and causing a high degree of compaction in the center of the track (Han *et al.* 2009). To summarize, heavy equipment operates directly on forest soils with a high potential to affect soil quality negatively, especially soil density, which then affects plant and tree growth (Labelle and Jaeger 2011). Soil compaction during harvesting generally occurs in the first few passes of the equipment, but compaction reaches a maximum within the first ten passes (Han *et al.* 2006). Bustos and Egan (2011) noted that compaction is a function of mass, number of trips (i.e., passes), and total mass transported per trip. Using historic skid trails and a designated trail system is recommended as soils with high initial bulk densities compact less than those with a low initial bulk density (Han *et al.* 2009).

In the 1995 RMPs, the BLM used a percentage of compacted surface area within a harvest unit to set a threshold for acceptable impacts to soil productivity. The districts initially set this threshold level at 10 or 12 percent of the harvested area, depending on the district. Instruction Memoranda OR-2010-009 provided guidance to adopt the revised Best Management Practices (BMPs; as contained in Appendix I of USDI BLM 2008) for use when designing individual projects and for water quality restoration planning activities. Specifically, BMP TH-9 states a 12 percent level of compaction, and provided a consistent approach for all of the districts. Thus, this analysis used a 12 percent level for the No Action alternative.

In the 1995 RMPs, the BLM also anticipated treating compacted surfaces after use, typically with a winged sub-soiler implement pulled behind a dozer to treat skid trails in final harvest units. Treating compacted skid trails in thinning units has proven problematic, and has generally been deferred until final harvest, as the sub-soiler damages roots of the residual stand.

Affected Environment and Environmental Consequences

Current levels of detrimental soil disturbance from past timber harvest are 29,564 acres in the decision area: 12,688 acres are in the coastal/north and 16,876 acres are in the interior/south (**Figure 3-152**). The 29,564 acres of detrimental soil compaction from past timber harvest constitutes approximately 1 percent of the decision area as a whole.

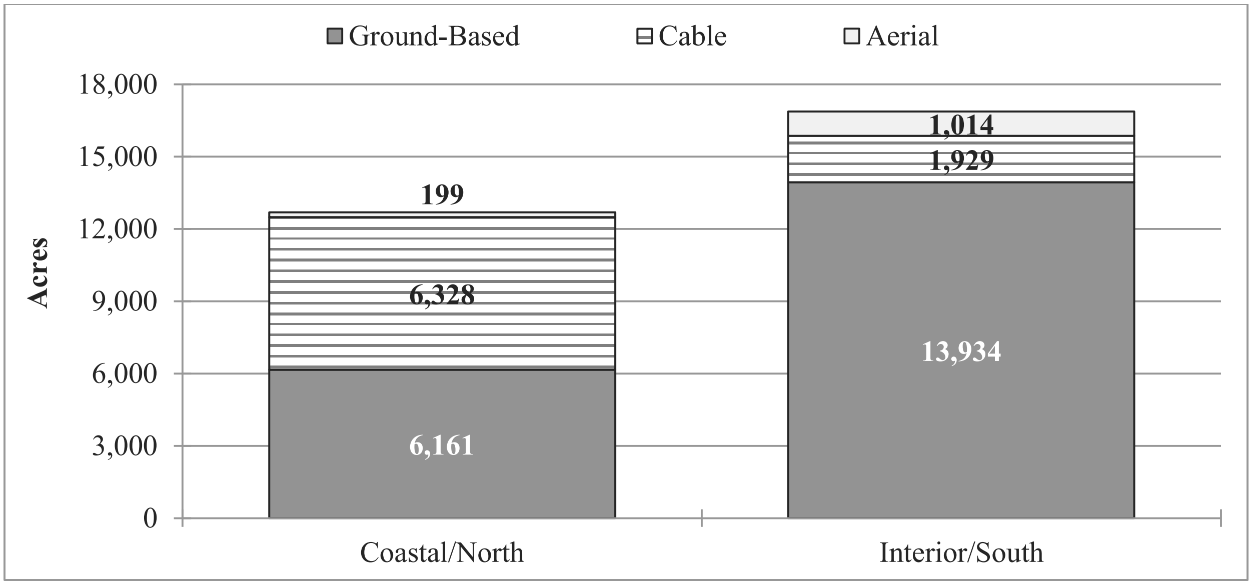

Figure 3-152. Detrimental soil disturbance from timber harvest by yarding system, 1990-2012.

This acreage of detrimental soil disturbance constitutes 20 percent of the harvested acres in the decision area: 17 percent in the coastal/north, and 23 percent in the interior/south. The interior/south has detrimental soil disturbance on a higher percentage of harvested acres because of the more extensive use of ground-based yarding systems, which result in more detrimental soil disturbance within each harvest unit.

In the first 10 years, the alternatives would result in approximately 12,000-27,000 acres of detrimental soil disturbance from timber harvest (**Figure 3-153** and **Table 3-208**). Alternative C would result in the most acreage of detrimental soil disturbance (27,000 acres), with only slightly smaller acreage in Alternative B (25,217 acres), the No Action alternative (24,172 acres), and Alternative D (21,742 acres). In contrast, Alternative A would result in substantially smaller acreage of detrimental soil disturbance compared to the other alternatives (12,036 acres) (**Table 3-208**). The amount of detrimental soil disturbance largely reflects the total acreage of timber harvest and, specifically, the acreage of timber harvest in the interior/south, where ground-based yarding predominates.

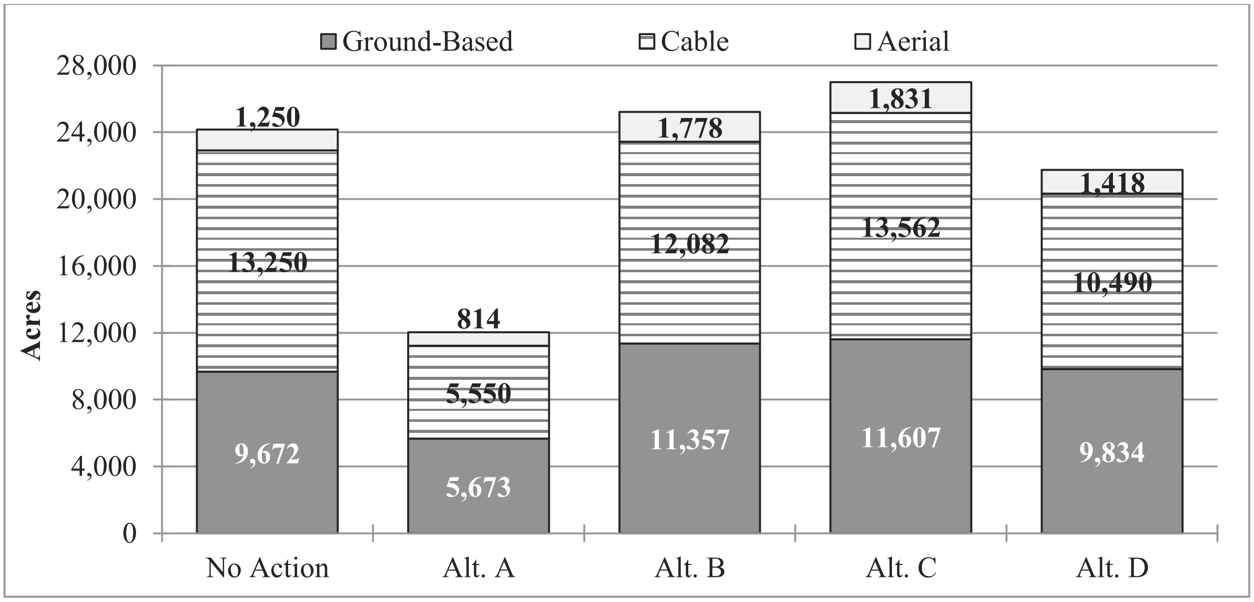

Figure 3-153. Detrimental soil from timber harvest by yarding system and alternative during the first decade.

Table 3-208. Detrimental soil disturbance from timber harvest by alternative and harvest method during the first decade for the coastal/north and interior/south.

Detrimental Soil Disturbance	No Action		Alt. A		Alt. B		Alt. C		Alt. D	
	Coastal/ North	Interior/ South	Coastal/ North	Interior/ South	Coastal/ North	Interior/ South	Coastal/ North	Interior/ South	Coastal/ North	Interior/ South
Ground-based (Acres)	5,496	4,176	2,285	3,388	4,847	6,510	5,633	5,975	4,411	5,423
Cable (Acres)	9,320	3,930	3,304	2,246	7,368	4,715	8,812	4,750	6,760	3,730
Aerial (Acres)	777	473	349	465	676	1,102	873	958	580	839
Area Totals (Acres)	15,594	8,578	5,938	6,098	12,890	12,327	15,318	11,682	11,750	9,992
Alternative Totals (Acres)	24,172		12,036		25,217		27,000		21,742	
Current Condition* (Acres)	29,564		29,564		29,564		29,564		29,564	
Totals (Acres)†	53,736		41,600		54,781		56,564		51,306	
Percentage of Current Condition	80%		41%		85%		91%		74%	

*This acreage is derived from **Figure 3-152** which only described detrimental soil disturbance from the years 1990-2012.
†This number does not account for detrimental soil disturbance that is ameliorated over time.

The detrimental soil disturbance from timber harvest during the first decade under the alternatives would range from 41-91 percent of the current detrimental soil disturbance from past timber harvests (**Table 3-208**). As a result, the alternatives together with past timber harvest would result in a cumulative total of detrimental soil disturbance ranging from 41,600 acres to 56,564 acres.

Each alternative would result in detrimental soil disturbance on an average of 15 to 16 percent of the total area harvested in the first 10 years.

Detrimental soil disturbance could result in some reduction in future tree growth. At this scale of analysis and with the data available, it is not possible to quantify the reduction in future tree growth from detrimental soil disturbance, in part because of the influence of site-specific and project-specific factors on the extent and intensity of detrimental soil disturbance. The BLM would be able to ameliorate detrimental soil disturbance by reducing soil compaction after harvest; however, because the extent and effectiveness of such amelioration depends heavily on site-specific and project-specific factors, the BLM cannot quantify those reductions in detrimental soil disturbance in this analysis.

Issue 2

How would road construction under the alternatives affect soil quality?

Summary of Analytical Methods

In this analysis, the BLM assumed that both permanent and temporary road construction would result in detrimental soil disturbance. It is not possible to forecast in this analysis whether how much decommissioning might mitigate detrimental soil disturbance, or how long after decommissioning detrimental soil disturbance would continue. Therefore, this analysis assumed that road construction would result in detrimental soil disturbance, even though eventual decommissioning might mitigate these soil effects for some roads.

The BLM assumed that road construction would result, on average, in detrimental soil disturbance across a 45-foot width, from upper cutbank to the lower toe of fill (Brian Thauland, BLM, personal communication, July 2013).

The calculation of the mileage of road construction under each alternative is described in the Trails and Travel Management section in this chapter.

The BLM calculated the acreage of detrimental soil disturbance from road construction by multiplying the length of roads by the 45-foot road width.

The Planning Criteria identified that this analysis would also address landings (USDI BLM 2014, p. 156). However, most of the landing area would be included in road construction and is therefore not included here as a separate analysis.

Background

Road construction results in detrimental soil disturbance, which decommissioning can potentially ameliorate. However, the effectiveness of decommissioning in reducing detrimental soil disturbance is not clear. Tan *et al.* (2009) note better growth on compacted sites with coarse sandy soils. Most of the decision area does not have coarse sandy soil types, with the exception of some areas in the Medford District.

As noted by Powers *et al.* 1990, soil compaction and organic matter removal are the two most important site disturbances caused by forest management practices. These have the greatest potential to reduce forest productivity. Replenishing the organic matter and reducing the amount of compaction both within the depth of a road surface and across the surface are key ingredients to providing a quality soil-growing medium for future tree growth. Lloyd *et al.* (2013) describes the effectiveness of different road decommissioning techniques for rehabilitation of ecological and hydrological systems in densely roaded forest ecosystems. Their overarching hypothesis is that restoration designs that fail to address explicitly both above- and below-ground ecosystem structure and function may result in recovery to an alternative state that has diminished ecological and hydrological functions relative to a "never-roaded" forest.

Affected Environment and Environmental Consequences

There are currently 14,416 miles of roads in the decision area. This constitutes a detrimental soil disturbance on 79,311 acres, approximately 3 percent of the decision area.

Over the first decade, the No Action alternative would create the largest acreage of detrimental soil disturbance from road construction (5,167 acres;) while Alternative D would create the least (1,388 acres; **Figure 3-154**).

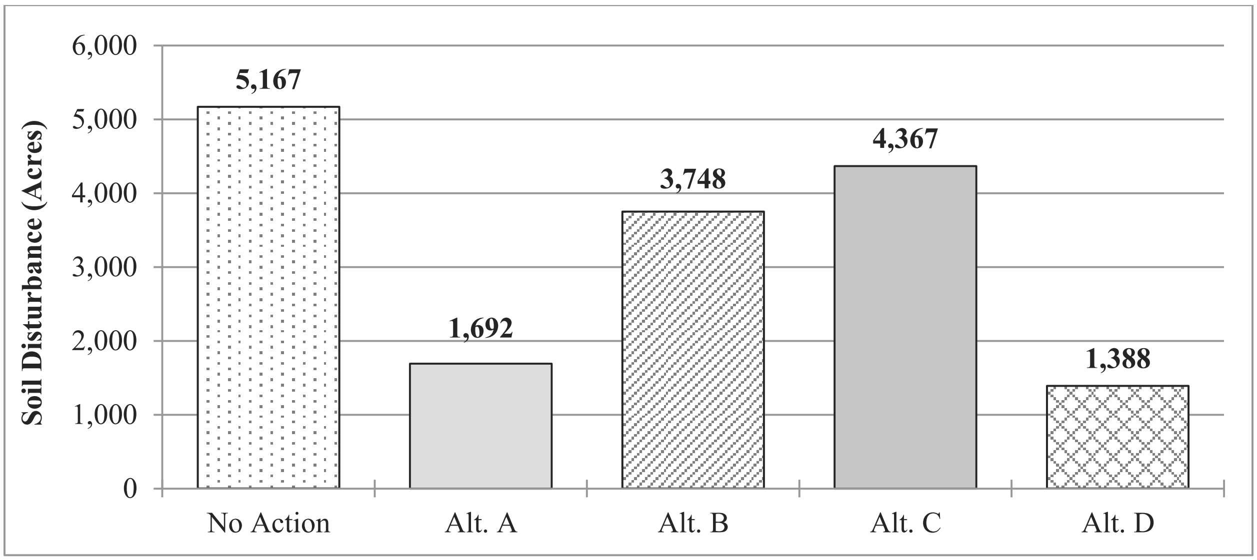

Figure 3-154. Detrimental soil disturbance from road construction by alternative during the first decade.

The detrimental soil disturbance from road construction during the first decade under the alternatives would be approximately 2 to 7 percent of the current detrimental soil disturbance from past road construction (**Table 3-209**). As a result, the alternatives together with past road construction would result in a cumulative total of detrimental soil disturbance ranging from 80,699-84,478 acres.

Table 3-209. Acres of detrimental soil disturbance from road construction by alternative during the first decade.

Detrimental Soil Disturbance From Road Construction	No Action	Alt. A	Alt. B	Alt. C	Alt. D
Current Condition (Acres)	79,311	79,311	79,311	79,311	79,311
Effects of the Alternatives (Acres)	5,167	1,692	3,748	4,367	1,388
Totals	84,478	81,003	83,059	83,678	80,699
Percentage of Current Condition	6.5%	2.1%	4.7%	5.5%	1.8%

Under all alternatives, approximately 60 percent of the new road construction would likely be permanent roads and 40 percent temporary roads. Temporary roads include both native-surfaced and rock-surfaced roads. The BLM could potentially decommission or obliterate temporary roads to ameliorate detrimental soil disturbance, including removing rock, loosening the compacted sub-grade, replenishing some of the organic matter, and implementing erosion-control measures.

Given the vast size of the planning area and the complexity of road construction, not all temporary roads would undergo decommissioning adequate to ameliorate detrimental soil disturbance. However, temporary roads disturb less of the subsoil and have lower traffic volumes and so would be the most likely to be decommissioned or obliterated. Under all alternatives, decommissioning of temporary roads would provide some reduction in the acres of detrimental soil disturbance, but it is not possible at this scale of analysis with the data available to quantify this potential reduction in this analysis.

Even if all newly constructed roads were permanent, the increased acreage of detrimental soil disturbance from new road construction in the first decade under the alternatives would range from 1.8-6.5 percent (**Table 3-209**). This would be an increase from the current condition of 3.2 percent of the decision area with detrimental soil disturbance from road construction, to 3.26 to 3.41 percent after 10 years, depending on alternative. This represents a very minor increase in the acreage of detrimental soil disturbance from road construction, and represents an overestimation, because the BLM does not quantitatively account for potential reductions from road decommissioning and obliteration.

Issue 3

How would fuel reduction treatments under the alternatives affect soil quality?

Summary of Analytical Methods

Fuel reduction treatments can result in detrimental soil disturbance from soil compaction, soil displacement, erosion of bare soils, excessive heating of soil, or production of a thick mulch of chopped or chipped vegetation. The portion of treated areas experiencing detrimental soil disturbance varies by fuel reduction methods.

In this analysis, the BLM grouped together fuel reduction treatments for activity fuels (the slash remaining after timber harvest) and for hazardous risk fuels not associated with timber harvest. This is a change from the discussion in the Planning Criteria, which presented separate issues for the effects of treatment of activity fuels and hazardous risk fuels (USDI BLM 2014, pp. 166-171). At this scale of analysis with the data available, fuel treatments for activity fuels or hazardous risk fuels do not have a discernible difference in creating detrimental soil disturbance.

This analysis evaluated fuel reduction treatments over a 22-year period. Fuel reduction by any method is temporary in nature, as vegetation resprouts and needs retreatment in 5 to 15 years. In some instances, the type of fuel treatment changes from removal of larger diameter trees to the reduction of understory shrubs or small diameter trees, which increase the fuels component after overstory removals.

The BLM derived the acreage of past fuel reduction treatments for activity fuels by querying the Mechpoly and Burnpoly corporate BLM data.[91] The BLM used the Woodstock model outputs to obtain acreages for each alternative for the six different silvicultural treatments of broadcast burns, hand piles, machine piles, landing piles, lop and scatter, and mastication during the first decade.

The BLM derived the acreage of fuel reduction treatments for hazardous risk fuels by querying the district fuel specialists for the level of treatment in the past two decades, and then the BLM projected a future decadal level of treatment. The BLM assumed in this analysis that the amount of fuel reduction treatments for hazardous risk fuels would be the same among all alternatives. Based on the management objectives and management direction in all of the alternatives, the BLM concluded that there is no basis for predicting a change in treatment of hazardous risk fuels from current and recent practices, regardless of how other land management decisions may change under the alternatives.

The BLM assumed that detrimental soil disturbance would occur on 25 percent of areas treated with excavator machine piling, 35 percent of areas treated with heavy machinery mastication methods, and 5 percent of areas treated with broadcast burning. These estimations are based on the amount of travel equipment make across the units, the length of the boom on the equipment, the size of the piles, the material size to burn, and conclusions from literature describing negative effects to the soil.

In this analysis, the BLM assumed that hand pile burning, landing pile burning, and lop and scatter methods of fuel reduction treatment would not result in measurable detrimental soil disturbance at this scale of analysis. Hand-piling material that is smaller in diameter and in smaller piles typically does not generate lethal soil temperatures. Landing piles can be large enough to generate lethal temperatures but the area already has detrimental soil disturbance from the road construction. The BLM has used two methods of lop and scatter; 1) Using manual labor to cut and disperse excess vegetation in the area treated, or 2) Using mechanical grinders to cut and disperse excess material (Busse *et al*. 2014). Grinding equipment remains on existing roads, limiting the potential for detrimental soil disturbance. Neither method would result in detrimental soil disturbance that would be measureable at this scale of analysis.

In this analysis, the BLM assumed that machine pile burning and broadcast burning have the potential to cause some detrimental soil disturbance, especially where concentration of slash would cause deep heating of the soil, or where large wood would be allowed to smolder for long periods of time. However, these circumstances would constitute only a small portion of the broadcast burn area, and quick mop-up after burning would limit the scope and extent of any detrimental soil disturbance. For machine piling, the scattered nature of constructing piles is reliant on the excess fuel loading. Less fuel equals larger distances between piles and potentially less compaction and lethal temperatures during ignition of the piles. The burning of machine piles causes detrimental soil disturbance from both the soil compaction around the pile from the equipment and the heating of the soil beneath the center of the pile.

[91] These are two layers in the BLM's corporate GIS database. As fuel reduction treatments are completed, specialists input the activity into these layers. However, not all specialists have input the data do these layers are incomplete.

Generally, mastication involves using mechanical equipment to grind cut vegetation and distributing treated material by spreading or blowing it out on the ground (Busse *et al.*, 2014). For mastication of fuels, the BLM assumed that most machines would be mobile across the treatment area. The impact to the soil resources would come from compaction, displacement, and some concentration of chipped material deeper than three inches. The BLM has employed boom excavators and horizontal bar type machines that need to traverse most of the unit for mastication. Grinding of heavy fuel loads has, in the past, built up chipped material that impedes plant growth.

The Planning Criteria provides more discussion of the analytical methods for detrimental soil disturbance from prescribed burning and is incorporated here by reference (USDI BLM 2014, pp. 157-161).

Background

Prescribed fire can heat the soil to a lethal temperature that kills the microbial activity, which process organic matter in the soil to provide nutrients to growing vegetation. These same organisms connect roots and soil, which provide additional water and increase the water uptake for the plant. Inadequately populated soils that lack the corresponding diverse bacterial and fungal communities demonstrate reduced growing capacity and function, which results in less vegetative growth.

The effects of prescribed burning on soil physical, chemical, and biological properties depend on the specific properties or species. Threshold temperatures classed by Busse *et al.* (2014) for soil physical, chemical, and biological properties fall into low, moderate or high classes. Mortality of bacteria or fungal components, as well as seeds and fine roots of plants within the soil, occurs in the low class, between 100 and 300 °F degrees. Most soil structure and organic matter changes occur in the moderate class, between 390 and 930 °F. The high class is where nutrient volatilization proceeds and occurs between 700 and 2,700 °F. The lethal threshold for roots is approximately 140 °F, while that of many soil organisms is between 122 and 392 °F.

Chemical and biological effects to soils from prescribed burning include oxidation of surface and soil organic material, changes in nutrient availability and pool size, changes in pH, and lethal heating to biota and fine roots. Soil properties most indicative of detrimental changes differ between fuel reduction practices, making comparisons among treatment types problematic.

Soil heating is a particular concern given anticipated changes to soil nutrient content and availability, microbial composition and function, soil carbon content, soil mineralogy, and water repellency, and infiltration following severe burning (Neary *et al.* 2005). Busse *et al.* (2013) determined that, regardless of pile size or fuel composition, the soil heat pulse during burning was quenched rapidly with soil depth. The greatest soil heating occurred in the surface 4 inches, whereas benign temperatures registered at the 12-inch depth; mean maximum values were 104 °F for slash piles and 167 °F for woodpiles. Soil moisture plays a key role in heating dynamics, particularly when burning natural fuels or scattered slash. Heat penetration is substantially lower in moist soil than in dry soil due to the additional energy required to heat water (Busse *et al.* 2010).

Soils in the interior/south are generally lower in organic matter and nutrients and are more susceptible to degradation by prescribed fire than soils in the coastal/north. Detrimental soil disturbance from prescribed burning is particularly severe with machine piling, because piled fuel concentrates heat in the center of the pile, and the equipment compacts the soil around the pile. Smaller hand piles or the use of broadcast burning generally results in less detrimental soil disturbance than machine piling.

Mastication involves cutting and grinding vegetation. Mastication occurs with various types of equipment, including wheeled or tracked equipment, equipment with a rotary head attached to a boom, and equipment with the rotary mechanism attached directly to the front of the equipment. Boom-mounted masticators can reach areas such as deep ditches and steep embankments and can treat more area with less compaction than machines with the rotary mechanism on the front of the machine (Ryans and Cormier 1994). Tracked equipment can work on steeper slopes and softer soils than wheeled equipment. Mastication may cause some soil compaction and displacement, depending on the type of equipment, soil conditions and type, operator experience, and stand conditions. Limiting masticators to designated trails or using low-ground-pressure equipment can reduce the extent and intensity of physical soil disturbance (Busse *et al.* 2014). Most mastication fuel treatments are fundamentally different from ground-based harvest yarding systems, in which yarding concentrates traffic to trails that receive multiple passes. Most masticators track over broad areas to treat fuels, especially if using a horizontal fixed bar design. Boom-mounted masticators are more similar to ground-based yarding; for this type of mastication treatment, confining the equipment to trails, operating on a deep slash mat, and using low ground pressure equipment reduces or avoids detrimental soil disturbance.

Mastication produces a coating of cut vegetation debris across the forest floor. Because the resulting debris is unlike the natural forest floor in terms of particle size, composition, bulk density, and moisture regime, there are few direct comparisons to natural wildland systems or processes. There are so few studies of mastication impacts on soil resources within the planning area that it is difficult to interpret long-term ecological consequences. Short-term studies published in the last 5 years have found few detrimental effects, but the majority of these studies are conducted on sandy soils in California and juniper woodland vegetation types in Colorado. Those soils do not compact in the same negative manner as the clay-textured soils in the planning area. Most short-term impacts center around compaction, mycorrhizal reductions, and nutrient loss or tie up, but long-term consequences or indirect effects from mastication remain largely unstudied (Busse *et al.* 2014). These same studies caution that results are very site-specific, taking the results to other treatment areas needs to be conducted with caution, and much more research is needed to understand the variability across landscapes. Thus, the BLM has cautiously assumed that mastication will affect soil resources in a manner similar to timber harvesting with mechanical type systems.

Mastication can substantially modify soil temperature and moisture regimes by creating mulch that insulates the soil and traps moisture at the soil surface. This mulch may keep soils cooler in the summer and warmer in the late fall and early winter. The extent the cut vegetation debris is incorporated into the soil during mastication determines the degree that soil temperature changes and water content increases. Masticated debris can act as a barrier against both water infiltration into the soil and evaporative losses from the soil.

Reducing fuels through mastication has limited short-term effects on soil microbial communities, largely because of the insulating and buffering effect of the cut vegetation debris. Mastication removes vegetation, which opens treated areas to the sun, but the resultant mulch reduces soil drying. Studies of mastication treatments in pinyon-juniper woodlands did not find differences in abundance, species richness, or community composition of arbuscular mycorrhizal fungi 2.5 years after treatment (Busse *et al.* 2014).

Mastication may reduce soil nitrogen availability. Mulch is generally low in nitrogen and high in carbon. After the mulch is added to the soil, microbes will use inorganic nitrogen from the soil in order to decompose the added carbon-rich material. Under such circumstances, this nitrogen immobilization could temporarily reduce the amount of soil nitrogen available for plant growth. While such effects on soil nitrogen are possible, few studies have examined nitrogen transformations and dynamics following mastication. The depth of mulch influences the effect of these treatments on plant available nitrogen. Ryan *et al.* (2011) found that patchy mulch 0.5 to 1.5 inches thick had no negative impact on soil nitrogen at the stand level, but uniform mulch 3 to 6 inches thick had substantial effects on soil nitrogen.

While the depth of the mulch layer was not identified, in a comparison of fuel treatments in the Sierra Nevada Mountains, commercial thinning followed by mastication did not significantly alter available nitrogen or net nitrification rates two years after treatment, compared to untreated control stands (Moghaddas and Stephens 2007). The soil moisture content of the study area is drastically less than the coastal/north portion of the decision area, and the microbial processes may not come into equilibrium in the same manner of the studies.

A study conducted from 2003 to 2008 on the southeastern edge of the Klamath Mountains in northern California, found that overall the community composition and species richness of mycorrhizal fungi were not significantly altered by any of the mastication and burning treatments (Southworth and Gibson 2010). In addition, soil nutrients at the depth of fine roots and mycorrhizal fungi were not significantly changed due to mechanical mastication followed by burning, and soil nutrient composition did not vary among treatments. Reduction in the fruiting bodies of truffles did occur if the masticated fuels were burned. This study area comes closest to soil and weather conditions found in the interior/south portion of the decision area. Limited research in this area, particularly on clay-textured soils that are well-drained, makes it difficult to determine that similar results will occur in the decision area, particularly in the coastal/north area.

Fuel reduction through biomass removal can remove both carbon and nutrients. Long-term productivity can be reduced by removing these materials, particularly where soils are low in these nutrients in the first place (Poggiani and Couto 1983, Swank and Reynolds 1986). The risk of reduction in soil quality due to nutrient loss is greatest in the areas of lower productivity in the interior/south. Removal of material to meet hazard reduction goals may conflict with long-term site productivity.

Under the 1995 RMPs, the BLM has placed greater emphasis on removing hazardous fuel in the interior/south than in the coastal/north (**Table 3-210**). Fuel reduction for hazard risk has included removal of material along roadsides or pulling material into treated harvest units, which the BLM may not have recorded in the data as fuel reduction treatments. Many areas recorded as burn treatments in another database do not reflect in the totals as hazardous fuels reduced.

Table 3-210. Fuel treatments by method, 2003-2012.

Fuels Treatment	Coastal/North			Interior/South			Totals (Acres)
	Activity Fuel (Acres)	Hazardous Risk Fuel (Acres)	Total Area Treated (Acres)	Activity Fuel (Acres)	Hazardous Risk Fuel (Acres)	Total Area Treated (Acres)	
Underburn/Broadcast Burn	81,142	2,725	81,414	57,095	33,053	90,148	**171,562**
Machine Pile and Burn	310	16,690	17,000	33,976	25,018	58,994	**75,994**
Mastication	-	2,773	2,773	-	5,359	5,359	**8,132**
Total Treatment Acres	**81,452**	**22,188**	**101,187**	**91,071**	**63,430**	**149,677**	**250,864**

Affected Environment and Environmental Consequences

Fuel treatments over the past 20 years have resulted in detrimental soil conditions on 30,424 acres in the decision area: 9,292 acres in the coastal/north and 21,132 acres in the interior/south (**Table 3-211**).

Table 3-211. Detrimental soil disturbance from fuel treatments by method, 2003-2012.

Fuels Treatment	Coastal/North (Acres)	Interior/South (Acres)	Totals (Acres)
Underburn/Broadcast Burn	4,071	4,507	**8,578**
Machine Pile and Burn	4,250	14,749	**18,999**
Mastication	971	1,876	**2,847**
Totals	**9,292**	**21,132**	**30,424**

For each alternative, the total detrimental soil acres from treatment disturbance ranges from approximately 10,100 to 4,400 acres (**Figure 3-155**). This acreage equals from 5 to 7 percent of the acres treated in each of the alternatives. Alternative C would result in the greatest amount of detrimental soil disturbance from fuel treatments (10,139 acres), and Alternative D would result in the least (4,346 acres). The No Action alternative and Alternatives A and B would result in only slightly more detrimental soil disturbance from fuel treatments than Alternative D, and substantially less than Alternative C.

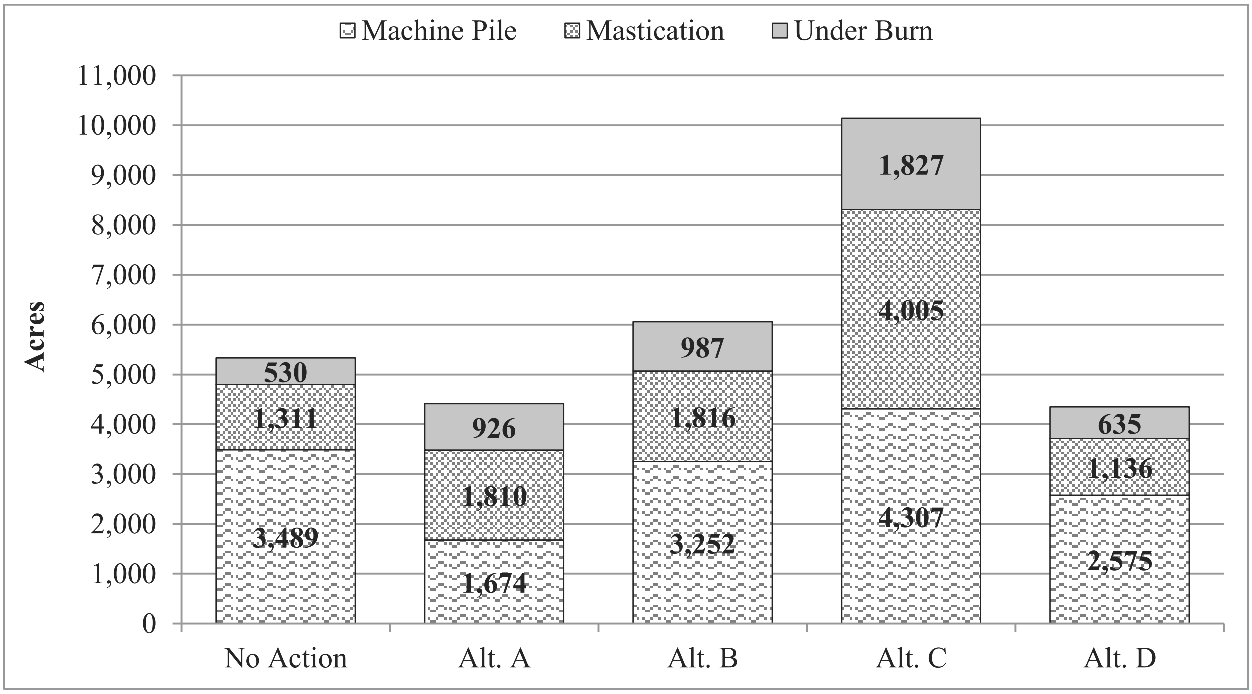

Figure 3-155. Detrimental soil disturbance from fuel treatments by alternative during the first decade.

The detrimental soil disturbance from fuel treatments during the first decade under the alternatives would be approximately 14 to 33 percent (**Table 3-212**) of the current detrimental soil disturbance from past fuel treatments. As a result, the alternatives summed with past fuel treatments would result in a cumulative total of detrimental soil disturbance ranging from 34,770 acres to 40,563 acres.

Table 3-212. Detrimental soil disturbance from fuels treatments compared to the current condition.

Detrimental Soil Disturbance From Fuel Reduction Treatments	No Action	Alt. A	Alt. B	Alt. C	Alt. D
Current Condition (Acres)	30,424	30,424	30,424	30,424	30,424
Effects of the Alternatives (Acres)	5,330	4,410	6,055	10,139	4,346
Totals	**35,754**	**34,834**	**36,479**	**40,563**	**34,770**
Percentage of Current Condition	**18%**	**14%**	**20%**	**33%**	**14%**

There are differences between alternatives based on the method of treatment that would produce different detrimental effects. In all alternatives except Alternative A, machine piling would be the largest contributor to detrimental soil disturbance (**Figure 3-155**). Mastication would be the largest contributor to detrimental soil disturbance in Alternative A. Where machine piling would occur, there would be compaction that may reduce seedling growth or vegetative cover of native plants. Where soil is heated above lethal temperatures, there may be loss of microbial activity and potential attachment to roots to improve growth. If masticated materials accumulate in layers greater than 3 inches, the mulch layer would impede transpiration, water infiltration, and seedling growth.

Issue 4

How would off-highway vehicle use under the alternatives affect soil quality?

Summary of Analytical Methods

In this analysis, the BLM assumed that areas allocated as *open* for off-highway vehicle (OHV) use would experience detrimental soil disturbance. Areas designated as *closed* would not experience detrimental soil disturbance, because the BLM would not permit off-highway vehicle use. Areas designated as *limited* would not experience measurable additional detrimental soil disturbance, because the BLM would limit off-highway vehicle use to existing or designated roads and trails, which have already experienced detrimental soil disturbance through the construction of the roads or trails. Until the BLM completes route designations through implementation level planning, the BLM cannot identify which routes would be designated in any alternative. Therefore, the BLM cannot quantify these more site-specific effects in this analysis, and the BLM would address these effects as part of the analysis supporting the implementation level decisions.

In this analysis, the BLM assumed that OHV users would operate vehicles consistent with BLM decisions about OHV use. Although the BLM has some site-specific and anecdotal information about illegal OHV use, the BLM does not have a basis for predicting the location or effects of any widespread or systematic illegal OHV use. In addition, much of the decision area has physical limitations to potential illegal OHV use, including dense vegetation, steep slopes, and locked gates. In most of the interior/south, the ability to track numerous different routes across the open spaces can lead to degradation and erosion in a greater proportion than most of the coastal/north. However, the BLM lacks a basis for characterizing current illegal OHV use or forecasting such potential illegal OHV use in the future under any of the alternatives at this scale of analysis.

Background

Off-highway vehicle use can cause detrimental soil disturbance as vehicle traffic compacts or displaces soil (Ouren *et al*. 2007). The effects can be vary based on the type of vehicle. Off-highway vehicles include 2- and 4-wheel all-terrain vehicles, large 4-wheel drive trucks, sport utility vehicles, and any other vehicle capable of off-road travel. Depending on the type of soil, there will be different effects. Relatively uniform sandy or clay soils are less vulnerable to compaction than loamy sands or coarse-textured, gravelly soils characterized by variability in particle size (Lovich and Bainbridge 1999). In addition, soils capable of holding greater water content are more susceptible to compaction than soils containing less moisture (Webb 1982). However, even soils in semi-arid and arid lands experience problematic compaction, because the texture of these soils is slow to recover through natural soil-loosening processes, including shrinking, swelling, drying, wetting, freezing, and thawing (Webb 1982).

Off-highway vehicle use can cause soil erosion, which occurs when fine-grained particles blow off in the wind or wash off when precipitation occurs on the unprotected surface. The removal of the top layers of soil, particularly the organic matter, degrades the potential for soil function. The result can range from a barren surface or very deep gullies, depending on soil type, slope gradient, and amount of exposure to precipitation.

Affected Environment and Environmental Consequences

Under the No Action alternative, approximately 85,000 acres (3.3 percent) of the decision area would remain *closed* to OHV use, and approximately 330,400 acres (12.8 percent) would remain *open* to OHV use (**Table 3-213**). On the remaining 83.9 percent, OHV use would remain *limited* to existing roads and trails or designated roads and trails. On some portion of the 330,400 acres open to OHV use, detrimental soil disturbance has been, and will continue, to occur. It is not possible for the BLM to determine at this scale of analysis with the data available how much of the 330,400 acres open to OHV use is actually experiencing detrimental soil disturbance or will in the future. However, within areas open to OHV use, such effects could occur throughout the open area without future analysis or decision-making by the BLM.

Table 3-213. OHV categories of use by alternative.

Trails and Travel Management	No Action		Alt. A		Alt. B		Alt. C		Alt. D	
	Acres	% of Total Acres	Acres	% of Total Acres	Acres	% of Total Acres	Acres	% of Total Acres	Acres	% of Total Acres
Closed	84,589	3.3%	128,757	5.2%	148,551	6.0%	178,001	7.2%	153,305	6.2%
Limited	2,156,712	83.9%	2,345,574	94.8%	2,325,763	94.0%	2,296,313	92.8%	2,320,987	93.8%
Open	330,394	12.8%	-		-		-		-	

Under all action alternatives, no areas would be open to OHV use. The entirety of the decision area would be closed to OHV use, or OHV use would be limited to existing roads and trails. As such, there would be no additional detrimental soil disturbance from OHV use measurable at this scale of analysis with the data available under any of the action alternatives.

Issue 5

How would the combination of timber harvest, road construction, and fuel reduction treatments[92] under the alternatives affect soil quality?

Summary of Analytical Methods

In this analysis, the BLM combined the individual levels of detrimental soil disturbance from timber harvesting, road construction, and fuels treatments. For the purposes of this analysis, the BLM considered all acres of detrimental soil to be equal: acres of detrimental soil disturbance from timber harvesting are equivalent to those from road construction or fuels reduction. There are differences in how detrimental soil disturbance from different management actions would affect soil quality. However, it is not possible to distinguish quantitatively these differences in detrimental soil disturbance at this scale of analysis with the data available. In addition, there would likely be some overlap in the acres of detrimental soil disturbance from these three sources (e.g., the same location within a harvest unit would experience detrimental soil disturbance from the ground-based yarding equipment during harvesting and from machine piling and burning during fuels treatment). However, it is not possible at this scale of analysis to separate the acres of detrimental soil disturbance from each source and identify overlapping acres. Therefore, these estimates overestimate the acres of detrimental soil disturbance, in part, because of overlapping acres.

The BLM compared the combined amount of detrimental soil disturbance to a threshold of 20 percent of areas treated. The BLM derived this analytical threshold, in part, from a U.S. Forest Service, Pacific Northwest Region standard, in which overall soil quality is considered negatively impacted and amelioration must ensue when detrimental soil disturbance exceeds 15 percent of an area treated (USDA FS 2010). However, this 15 percent standard does not account for road construction. The BLM increased this analytical threshold to 20 percent to account for detrimental soil disturbance from road construction. This 20 percent threshold only provides an approximate analytical threshold at this scale of analysis. Comparing the amount of detrimental soil disturbance as a percentage of total area treated across the decision area over 10 years to this 20 percent analytical threshold provides only limited and approximate information, it does not reveal whether or not any particular site or treatment area would exceed this 20 percent threshold. The relevant scale for evaluating detrimental soil disturbance and determining the need for mitigation or amelioration is at the site scale, such as an individual timber harvest unit or individual treatment area.

Affected Environment and Environmental Consequences

Currently, 139,299 acres in the decision area have experienced detrimental soil disturbance from past timber harvest, road construction, and fuel reduction treatments (**Table 3-214**).

Table 3-214. Detrimental soil disturbance from all sources, by the current condition and under all alternatives during the first decade.

Management Action	Current	No Action	Alt. A	Alt. B	Alt. C	Alt. D
Fuels Treatments (Acres)	30,424	5,330	4,410	6,055	10,139	4,346
Road Construction (Acres)	79,311	5,167	1,692	3,748	4,367	1,388

[92] While there is detrimental soil disturbance from OHV use, at this scale of analysis the BLM cannot quantify an amount. Therefore, the BLM did not combine detrimental soil disturbance from OHV use with these other sources because of this uncertainty.

Management Action	Current	No Action	Alt. A	Alt. B	Alt. C	Alt. D
Timber Harvest (Acres)	29,564	24,172	12,036	25,217	27,000	21,742
Totals	**139,299**	**34,669**	**18,138**	**35,020**	**41,506**	**27,476**
Total Alt. Combined with Current	**-**	**173,968**	**157,437**	**174,319**	**180,805**	**166,775**
Percentage of Current Condition		**25%**	**13%**	**25%**	**30%**	**20%**

Through the first decade, the alternatives would increase detrimental soil condition amounts by 13 to 30 percent of current amounts. Alternative C would result in the largest combined increase in detrimental soil disturbance (41,506 acres), and Alternative A would result in the smallest combined increase in detrimental soil disturbance (18,138 acres). Although detrimental soil disturbance from timber harvest has been the smallest source of detrimental soil disturbance in the past, it would be the largest source of detrimental soil disturbance under all alternatives in the future. New road construction would be low under all alternatives, as most of the required transportation system is currently in place. Fuel treatments under the proposed alternatives would use less of the treatment methods likely to result in detrimental soil disturbance than in past management.

As noted in the issues above, the BLM would be able to reduce the acreage of detrimental soil conditions from timber harvest, road construction, and fuels treatments through sound management practices that would limit initial compaction levels, remove existing or created compacted surfaces, and improve soil water and organic matter levels. Best management practices are listed and described in Appendix I. However, because the extent and effectiveness of such mitigation or amelioration depends heavily on site-specific and project-specific factors, the BLM cannot quantify those reductions in detrimental soil disturbance in this analysis.

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Sustainable Energy

Key Points

- Under all alternatives, the majority of the land in the decision area is available for the potential development of sustainable energy resources.
- Alternative C would make available the greatest amount of biomass.
- While Alternative A would have the greatest acreage in exclusion areas, the BLM concluded that Alternative D would be the alternative most likely to constrain wind energy and transmission line development substantially by designating over a third of the decision area as avoidance areas.
- While there is no current geothermal development and limited potential in the decision area, all action alternatives would be less constraining to geothermal development than the current condition, with Alternative A being the least constraining.

Background

For the purposes of this Draft RMP/EIS, the BLM uses the term sustainable energy in lieu of the term renewable energy, which is more commonly used in laws and policies guiding the management of the resources addressed in this section. The term "renewable" implies that an energy resource undergoes a *cycle* of availability, (i.e., a cycle that alternates between energy depletion and energy replenishment). For the purposes of this document, the BLM believes that it is more accurate to characterize these resources as sustainable.

Issue 1

How would management alternatives for forest treatment affect the availability of slash as a biomass energy source?

Summary of Analytical Methods

The BLM evaluated the alternatives and quantified them by projected volume of timber harvest under each alternative in MMbf. Using this harvest data, the BLM quantified the maximum quantities of slash that would be produced using the assumption, described more fully in the Planning Criteria, that 450 green tons of slash would be made available for every million board feet of harvest.

While other types of biomass exist, the BLM focused this analysis on slash (i.e., wood residue from timber harvest) since this is the specific type of biomass that provides the most practical opportunity for sustainable energy development in the planning area. Slash consists primarily of the branches and treetops of harvested merchantable timber. Slash excludes other biomass present in abundance but more difficult to transport such as snags, downed logs, and stumps (Cross *et al.* 2013, p. 1).

The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014, pp. 164-165).

Background

While the availability of 450 tons of green slash per million board feet of timber is an acceptable assumption for the purposes of this analysis, the precise amount of biomass produced would vary based on several factors including the location and type of harvested stand. Other factors include the amount of non-merchantable hardwoods, the amount of sub-merchantable material designated for cutting and removal in fire-prone stands, and the level of defect within a given stand. Thinning would typically produce biomass that consists mainly of tops and sub-merchantable stems, whereas regeneration harvest would produce more cull material and broken pieces.

Topography, vegetation, and yarding systems would affect the accessibility of biomass produced through timber harvest. Areas suitable for ground-based equipment would have a higher recovery level. Areas of steep, dense brush would have a lower recovery level due to the difficulty of locating the material and bringing it to a landing with cable yarding systems.

The sale of biomass also depends on market conditions. The amount sold is generally less than the available biomass would allow because this resource typically lacks sufficient energy density for economical transport as a fuel for electrical power generation except where generating plants are close to harvest areas.

There are wood fiber biomass combustion boilers at 21 industrial or institutional sites in the planning area. The boilers supply heat for industrial processes. At nine of these sites, steam-driven generators produce electric power. Private individuals and commercial companies also cut firewood on BLM-administered lands, which the BLM includes in the definition of biomass available on BLM-administered lands, but do not come from slash.

Affected Environment

Biomass occurs in abundance throughout the planning area, but as described above, factors such as the distance from harvest areas to power generation sites influence its production and sale. Based the harvest level, in 2012, 91,669 green tons of biomass were available as slash from BLM-administered lands within the planning area. In addition to its use for energy generation, biomass currently harvested in the decision area is also sold as landscaping material, raw manufacturing material for fiberboard, or charcoal briquettes.

Environmental Effects

Table 3-215 provides the biomass available as slash from BLM-administered lands under each alternative. As described above, a number of additional factors affect the biomass actually produced, as opposed to simply made available, from BLM-administered lands. These factors would almost certainly cause the production of less biomass from BLM-administered lands than is described as available in **Table 3-215**. These factors would be consistent across alternatives, so the results in the table provide a reasonable basis for comparing the relative levels of biomass made available under each alternative. Alternative C would make available the most biomass of the alternatives, followed by the No Action alternative, Alternative B, and Alternative A. Alternative D would make available the least amount of biomass from BLM-administered lands.

Table 3-215. Biomass available from BLM-administered lands as timber harvest slash by alternative.

Alternative	Green Tons
No Action	180,629
Alt. A	112,893
Alt. B	149,471
Alt. C	250,623
Alt. D	81,283

Issue 2

How would ROW avoidance and exclusion areas in the alternatives affect the potential siting of wind energy developments and sustainable energy corridor designations?

Summary of Analytical Methods

As presented in the Planning Criteria (USDI BLM 2014, pp. 164-165), the BLM intended to use the existing wind energy resource data compiled in the 2005 *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Land in the Western United States* (USDI BLM 2005) to assess how the alternatives interacted with the potential for wind energy development in the planning area of this RMP. However, the BLM found that the data in the 2005 Wind EIS is not detailed enough to reveal specific areas of high energy potential within the planning area.

Instead, the BLM compared acres of right-of-way (ROW) avoidance and exclusion across the alternatives to determine the extent to which each alternative might constrain the development of wind energy and sustainable energy transmission. The BLM administers both wind energy and transmission lines on BLM-administered lands through the granting of a ROW, so avoidance and exclusion areas would directly affect the potential for developing wind energy and transmission lines on BLM-administered lands. For the purposes of this analysis, the BLM assumed that ROW avoidance areas would preclude wind energy and transmission lines in most cases.

Background

According to the American Wind Energy Association, Oregon, as a whole, currently has approximately 435 megawatts (MW) of installed wind power generating capacity with another 140 MW proposed. The 2005 Wind EIS projected that by 2025, 196 MWs of wind energy will originate from BLM-administered land throughout Oregon (USDI BLM 2005, p. 5-104).

The NREL wind resource map for Oregon indicates that Oregon has wind resources consistent with community-scale production. The good-to-excellent resource areas for community-scale production are concentrated on ridge crests throughout the State. None of the good-to-excellent non-ridge crest areas with at least good wind resource potential are located in the planning area of this RMP. There are a few sites with wind resources of this quality along the ridge peaks of the Cascade Range on the eastern border of the planning area and scattered along the Pacific coast. Current NREL mapping resolution does not reveal the presence of utility-scale wind resources in the decision area (DOE EERE 2014, 80-Meters).

Wind energy development on BLM-administered lands is permitted through right-of-way (ROW) authorizations in accordance with requirements of FLPMA and the 2008 BLM Wind Energy Development Policy (2008 Wind Policy).

Affected Environment

There is no current wind energy production, or proposals for wind energy production, on BLM-administered lands in western Oregon. As noted in the background section, there are no known sites with potential utility-scale wind development for within the decision area for this RMP.

In addition to limited potential, the lack of infrastructure critical to development limits the development of sustainable energy resources, including wind, in western Oregon. There are currently no transmission lines that could easily transmit energy collected from wind energy on BLM-administered in the planning area. There are no current plans to construct transmission lines that could fill this need. Any transmission line through BLM-Administered land would require a ROW.

Environmental Effects

The alternatives being considered change the acreage of both Exclusion Areas and Avoidance Areas. **Table 3-216** compares the ROW exclusion acreage associated with each alternative. Since the BLM is unable to grant ROW for energy transmission corridors in exclusion areas, Alternatives A, B, and C all slightly increase the percent of the decision area on which the BLM could not grant a ROW for wind power under any situation short of a legal mandate. Alternative A would exclude wind energy and transmission line development from the greatest percentage of the decision area. Alternative D would very slightly decrease the current acreage of exclusion areas.

Table 3-216. Right-Of-Way Exclusion Area acres by alternative.

Exclusion Area Criteria	No Action (Acres)	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)	Alt. D (Acres)
Lands Designated as Wilderness	14,309	14,309	14,309	14,309	14,309
Lands Managed to Protect their Wilderness Characteristics	-	88,029	50,706	50,706	-
Designated and Suitable Wild and Scenic Rivers (Wild Only)	5,937	5,937	5,937	5,937	5,937
Visual Resource Management Class I	22,136	21,114	21,114	21,114	21,114
Totals	**42,382**	**129,389**	**92,066**	**92,066**	**41,360**
Percent of Decision Area	**1.66%**	**5.06%**	**3.60%**	**3.60%**	**1.62%**

The BLM is able to grant a ROW in Avoidance Areas if such a ROW is compatible with the protection of the values for which the BLM designated the Avoidance Area or no other route is possible. However, it is unlikely that the development of wind power would be compatible with the values for which the BLM would designate the Avoidance Areas. These Avoidance Areas would thus likely constrain the development of wind energy and sustainable energy transmission corridors on these BLM-administered lands. **Table 3-217** compares the ROW Avoidance acreage associated with each alternative. Alternative A would decrease the acres of Avoidance Areas compared to the No Action alternative, while Alternatives C and D would substantially increase this acreage. While Alternative A would have the greatest acreage in Exclusion Areas, the BLM concludes that Alternative D would be the alternative most likely to constrain wind energy and transmission line development substantially by designating over a third of the decision area as Avoidance Areas.

Table 3-217. Right-Of-Way Avoidance Area acres by alternative.

Avoidance Area Criteria	No Action (Acres)	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)	Alt. D (Acres)
Areas of Critical Environmental Concern	94,657	105,990	99,427	98,104	105,784
Recreation Management Areas	8,217	18,543	164,141	416,616	666,862
Wilderness Study Areas	1,208	1,208	1,208	1,208	1,208
Designated and Suitable Wild and Scenic Rivers (Scenic and Recreation only)	20,414	20,414	27,557	27,557	64,083
Visual Resource Management Class II that is not included in ROW Exclusion Areas	123,756	48,185	48,958	48,999	58,309
Total Avoidance Acres*	**243,928**	**179,436**	**326,510**	**575,444**	**871,713**
Percent of Decision Area	**9.54%**	**7.02%**	**12.77%**	**22.50%**	**34.08%**

* Right-of-way avoidance total acreage are not a direct sum from the individual criteria acres due to criteria that overlap geographically with each other. Areas that overlap with Right-of-Way Exclusion Areas are subtracted from the sum of the total avoidance acres due to right-of-way exclusion is more restrictive than right-of-way avoidance.

Issue 3

How would the alternatives affect the development of geothermal as a sustainable energy source?

Summary of Analytical Methods

To assess the effect of each alternative on the development of geothermal energy resources in the planning area, the BLM compared the extent to which each alternative would condition the development of fluid minerals; geothermal energy is managed as a fluid mineral. The BLM assumed that leasable stipulations (such as no surface occupancy) would negatively affect, though not entirely preclude, the potential for geothermal development on BLM-administered lands.

Background

Although Oregon has yet to achieve commercial generation of electricity from geothermal energy, the potential exists. A U.S. Department of the Interior report identifies 7 sites within Oregon as having the highest geothermal potential out of 35 sites on public lands throughout the country (Kirby *et al*. 2003). Among these sites, only the area within, and in the immediate surroundings of Klamath Falls, is within the planning area.

Affected Environment

There is no current geothermal development occurring on BLM-administered lands within the planning area. Geothermal potential exists in Oregon; however, it is primarily located in the eastern portion of the State. Some potential exists in the south-central part of the State on the eastern border of the planning area of this RMP (USDI BLM and USDA FS 2008, p. I-9).

There are currently 692,100 acres of BLM-administered lands to which the BLM has applied no surface occupancy stipulations.

Environmental Effects

The alternatives would impose requirements for fluid mineral stipulations on differing acreages of BLM-administered lands within the planning area. The differing arrangement in each alternative of ACECs, RMAs, suitable Wild and Scenic Rivers, and lands managed for their wilderness characteristics drives these differences. **Table 3-218** compares acres for which the BLM would require stipulations across the alternatives. It is important to note that while the No Action alternative acreage includes only acres to which the BLM has applied no surface occupancy stipulations, the action alternative acreages include all areas the BLM has identified as requiring stipulations, but these stipulations may include items such as timing stipulations in addition to no surface occupancy.

Table 3-218. Acres that would have leasable stipulations across alternatives.

	No Action (Acres)	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)	Alt. D (Acres)
Leasable stipulations	692,100*	190,389	211,638	318,915	498,525

* This includes only acres that are no surface occupancy

Under all action alternatives, the BLM would substantially reduce the acreage requiring leasable mineral stipulations compared to the No Action alternative. Alternative A would have the least acreage requiring stipulations. Thus, all action alternatives would be less constraining to geothermal development than the current condition, with Alternative A being the least constraining.

Issue Considered but Not Analyzed In Detail

How would management alternatives affect the development of solar radiation as a sustainable energy source?

In the joint BLM-DOE analysis, NREL could not demonstrate a potential for solar energy development to be a notable sustainable energy resource on BLM-administered lands in the planning area (USDI BLM and US DOE 2003, pp. 13-14, 19-20, A2-A3, E9). The BLM cannot assess the effects of the alternatives on this resource since the resource does not exist within the BLM-administered lands in the planning area.

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Trails and Travel Management

Key Points

- All action alternatives increase the number of closed area designations when compared to the No Action alternative.
- All Action Alternatives decrease the number of open area designations when compared to the No Action alternative.
- Alternative D provides the greatest number of trail based opportunities for both motorized and non-motorized recreation activities.
- Easements and Reciprocal right-of-way agreements secure access for BLM forest management activities. Reciprocal right-of-way agreements over O&C and Coos Bay Wagon Road lands do not grant rights for public access and recreational use. For this reason, a substantial portion of BLM-managed roads and BLM-administered lands lack legal public access.
- The overall replacement value of the BLM's transportation system exceeds $10 billion. Approximately 30 percent of the road mileage is in fair or poor condition, primarily due to depleted surfacing aggregate and worn-out minor culverts. Currently the deferred maintenance backlog exceeds $300 million.

Background

BLM-Administered Travel and Transportation System

The BLM manages a complex and well-utilized travel system within western Oregon. The BLM owns and manages approximately 15,000 miles of roads and 395 miles of designated trails within the decision area. The primary purpose for the development and uses of the BLM transportation system are access for resource management, recreation use, and the transportation of forest products. Given the BLM's checkerboard land ownership pattern, the road network has developed in concert with neighboring private timberland owners. The result is a joint-use BLM/private road network. The BLM currently has designated a network of trails and travel management areas within the planning area to address particular concerns and prescribe specific management actions for a defined geographic area. Travel management areas are a tool to frame transportation issues and help delineate and manage travel networks to address specific uses and resource concerns.

Long-term or perpetual reciprocal right-of-way agreements provide legal access to Federal and private timberlands for BLM administrative use and private timberland owners as authorized by the FLPMA and other Federal regulations. A reciprocal right-of-way agreement provides both the BLM and the private landowner with a non-exclusive right to use, construct and maintain logging roads on each other's property for forest management and harvest of forest products. These agreements are in effect on nearly 75 percent of BLM-administered lands in the planning area.

Reciprocal right-of-way agreements over O&C and Coos Bay Wagon Road lands under 43 CFR 2812 do not grant rights for public access and recreational use. For this reason, a substantial portion of BLM-managed roads and BLM-administered lands lack legal public access. Current commercial use of the BLM's portion of the joint-use network consists predominantly of log hauling.

Implementation Level Travel Planning

The BLM is deferring implementation-level Travel Management Planning (TMP) during the current RMPs for Western Oregon planning effort. Implementation-level TMP is the process of establishing a final travel and transportation network that includes route-specific designations within the broader land use planning level area designations. **Table 3-219** displays the existing off-highway vehicle area designations within the Western Oregon Planning area.

Table 3-219. Existing OHV designations within the decision area.

District/ Field Office	1995 RMP Travel Management Area Designation (Acres)						
	Open	Limited to Existing Roads and Trails	Limited to Existing Roads and Designated Trails	Limited to Designated Roads and Trails	Limited to Designated Roads	Closed	Totals
Coos Bay	-	-	-	318,676	-	3,489	322,165
Eugene	-	320,883	-	-	-	3,547	324,430
Klamath Falls	29,902	137,154	-	47,222	-	10,702	224,980
Medford	139,878	26,514	-	661,357	-	46,371	874,120
Roseburg	-	416,560	-	6,731	-	3,283	426,574
Salem	160,614	48,771	87,144	16,192	69,508	17,197	399,426
Totals	**330,394**	**949,882**	**87,144**	**1,050,178**	**69,508**	**84,589**	**2,571,695**

In the future, implementation-level travel planning will follow a site-specific process for selecting a final road and trail network. The BLM will make final route designations for the decision area in a comprehensive, interdisciplinary Travel and Transportation Management Plan scheduled to be completed within five years after the completion of the western Oregon RMPs. The BLM's geo-database will provide information for identifying roads and trails for both motorized and non-motorized recreation activities. The BLM began on-the-ground route inventories across the decision during the summer of 2014. Route inventories will continue throughout 2015. The BLM estimates that there are approximately 1,000 miles of non-designated user created routes within the decision area. The BLM will develop proposed future route designations through public scoping and NEPA analysis, utilizing the draft route inventories to evaluate amendments to the existing travel network during an implementation-level TMP. **Appendix P** includes interim OHV management guidelines that would be implemented in *limited* to existing designations until subsequent TMPs are complete.

R.S. 2477 Assertions

Section 8 of the Mining Act of 1866 provided: "and be it further enacted, that the right-of-way for the construction of highways over public lands, not reserved for public uses, is hereby granted." The statute was self-enacting; rights being established by "construction" of a "highway" on unreserved public lands, without any form of acknowledgement or action by the Federal government. This section of the statute was later re-codified as Revised Statute 2477 (R.S. 2477). The FLPMA repealed R.S. 2477 in 1976, with a savings provision for rights established prior.

A Travel Management Plan is not intended to provide evidence bearing on or addressing the validity of any R.S. 2477 assertions. R.S. 2477 rights are determined through a process that is entirely independent of the BLM's planning process. Consequently, travel management planning does not take into consideration R.S. 2477 assertions or evidence. Travel management planning is based on an independently determined purpose and need that is based on resource uses and associated access to public lands and waters. When a decision is made on R.S. 2477 assertions, the BLM will adjust its travel routes accordingly.

Issue 1

How would the alternatives affect the BLM's ability to provide trail and travel opportunities in western Oregon?

Summary of Analytical Methods

The BLM classified lands use allocations (i.e., *open*, *closed*, and *limited*) for travel and trail use by alternative. The BLM evaluated the alternatives and compared the number of acres, allowable uses, travel limitations, and modes of travel allowed under each travel designation. The BLM analyzed the effects that off-highway vehicle allocations would have on other affected resources within the planning area.

In this analysis, the BLM assumed that OHV users would operate vehicles consistent with BLM decisions about OHV use. Although the BLM has some site-specific and anecdotal information about illegal OHV use, the BLM does not have a basis for predicting the location or effects of any widespread or systematic illegal OHV use. In addition, much of the decision area has physical limitations to potential illegal OHV use, including dense vegetation, steep slopes, and locked gates. In most of the interior/south, the ability to track numerous different routes across the open spaces can lead to degradation and erosion in a greater proportion than most of the coastal/north. However, the BLM lacks a basis for characterizing current illegal OHV use or forecasting such potential illegal OHV use in the future under any of the alternatives at this scale of analysis.

The Planning Criteria provides additional information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014, pp. 115-119).

Descriptions of Indicators Used for Analysis

The analysis used the following indicators:

Travel Management Area Impact Indicators

The BLM manages motorized access under three possible categories based on BLM land use planning decisions that take into account natural resource protection and public safety. The off-highway vehicle categories are (1) *open*, which allows for unlimited travel, including cross-country, (2) *limited*, where OHV use is restricted to meet specific resource management objectives, and (3) *closed* to motorized use.

- Indicators: Travel Management Area designations: (1) the number of acres, allowable uses, travel limitations and modes of travel designated as *open*, *limited*, or *closed*; (2) the number of acres of recreation management areas where motorized or non-motorized trails are a primary recreation activity; (3) the management actions that result in short-term and long-term elimination, restriction, or reduction of travel opportunities to meet resource and resource use objectives for various programs. The BLM quantifies effects to these indicators where possible. For resources for which the BLM lacks quantitative data, it relies on professional judgment.

Background

Off-Highway Vehicle Area Designations

During this planning effort the BLM will make decisions about how it will generally manage OHVs in different parts of the planning area. As required by Executive Order and regulation, this RMP classifies all BLM-administered lands as *open*, *limited*, or *closed* to motorized travel activities. Definitions of *open*, *limited*, and *closed* areas are as follows:

- ***Open* areas**. Areas where the BLM does not limit of OHV use since there are no issues regarding resources, visitor conflicts, or public safety to warrant limiting cross-country travel.
- ***Limited* areas**. Areas where the BLM has restricted OHV use in order to meet recreational and resource management objectives. Restrictions may include the number or types of vehicles; the time or season of use; permitted or licensed use only; and limiting use to existing or designated roads and trails.
- ***Closed* areas**. Areas that the BLM has closed to all motorized vehicle use to protect resources, ensure visitor safety, or reduce visitor conflicts.

For areas classified as *limited*, the BLM would designate the types or modes of travel, such as pedestrian, equestrian, bicycle, motorized, etc.; limitations on time or season of use; limitations to certain types of vehicles (e.g., OHVs, motorcycles, and all-terrain vehicles); limitations on BLM administrative use only; or other types of limitations.

The BLM applied designation criteria in 43CFR 8342 when designating lands as *open*, *limited*, or *closed* to off-road vehicles. All designations are based on the protection of the resources of the public lands, the promotion of the safety of all the users of the public lands, and the minimization of conflicts among various uses of the public lands. These designations are in accordance with the following criteria:

1. Areas and trails shall be located to minimize damage to soil, watershed, vegetation, air, or other resources of the public lands, and to prevent impairment of wilderness suitability.
2. Areas and trails shall be located to minimize harassment of wildlife or significant disruption of wildlife habitats. Special attention will be given to protect endangered or threatened species and their habitats.
3. Areas and trails shall be located to minimize conflicts between of-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands, and to ensure the compatibility of such uses with existing conditions in populated areas, taking into account noise and other factors.
4. Areas and trails shall not be located in officially designated wilderness areas or primitive areas. Areas and trails shall be located in natural areas only if the authorized officer determines that off-road vehicle use in such locations will not adversely affect their natural, esthetic, scenic, or other values for which such areas are established.

Plan Maintenance and Changes to Route Designations

The RMPs that the BLM will adopt at the end of this RMP revision process will include indicators that guide future plan maintenance, amendments, or revisions related to OHV area designations or the approved road and trail system within “Limited to Existing” areas. Future conditions may require the designation or construction of new routes or closure of routes to better address resources and resource use conflicts. Actual route designations with the “Limited to Existing” category can be modified subsequent to RMP adoption without completing a plan amendment, although NEPA compliance will still be required.

Plan maintenance would be accomplished through additional analysis and implementation-level travel planning (e.g., activity level planning). The BLM would collaborate with affected and interested parties in evaluating the designated road and trail network for suitability for active OHV management and envisioning potential changes to the existing system or adding new trails that would help meet current and future demands within “Limited to Existing” area designations and broader Recreation and Travel

Management Areas that emphasize motorized OHV use. In conducting such evaluations, the BLM will apply designation criteria in 43 CFR 8342. The following factors would also be considered:

- Routes suitable for various categories of OHVs (e.g., motorcycles, all-terrain vehicles, full size 4-wheel drive vehicles) and opportunities for shared trail use.
- Needs for parking, trailheads, informational and directional signs, mapping and route profiles, and development of brochures or other materials for public dissemination.
- Opportunities to connect into existing or planned route networks.
- Measures needed to meet the objectives stated in the Western Oregon RMP (e.g., cultural resources, soil resources, special status species, and recreation).
- Affects to cultural resources in compliance with Section 106 of the National Historic Preservation Act.
- Public land roads or trails determined to cause considerable adverse effects or to continue a nuisance or threat to public safety would be considered for relocation or closure and rehabilitation after appropriate coordination with applicable agencies and partners.
- Those areas managed as closed will not be available for new motorized designation or construction.

Affected Environment and Environmental Consequences

Motorized and Non-Motorized Trails

The BLM manages 63 individual trails and trail systems that total over 395 miles in the western Oregon decision area. Trail-based recreation opportunities within the decision area include trail systems for motorized and non-motorized users, providing a range of available activities across various recreation settings. Popular activities include hiking, mountain biking, horseback riding, and OHV use. **Appendix P** contains an overview of the existing trail opportunities within the planning area.

Off-Highway Vehicle Area Designations

This section is an analysis of potential impacts on travel from implementing management actions and allowable uses to meet resource and resource use objectives for various programs. Travel designations support resource programs and are designed to help achieve their objectives. For example, a *closed* designation could be applied to protect sensitive wildlife or other special values. Impacts resulting from the travel system on other resources and resource uses are discussed in those specific resource sections of Chapter 3. **Table 3-220** summarizes proposed OHV area designations across the decision area by alternative. *Limited* area OHV designations would reduce cross-country OHV travel in an area, but would not eliminate it from existing and designated routes. A *closed* area OHV designation would completely prohibit motorized travel in the entire area.

Table 3-220. OHV area designations in western Oregon by alternative.

Trails and Travel Management Designations	No Action (Acres)	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)	Alt. D (Acres)
Closed to OHV Use	84,589	128,757	148,551	178,001	153,305
Limited to Designated Routes	1,119,686	13,874	13,874	13,874	13,874
Limited to Existing Routes	1,037,026	2,331,701	2,311,789	2,282,439	2,307,113
Open to Cross-country Travel	330,394	-	-	-	-

Table 3-221 shows types of areas *closed* to OHV travel by alternative and other land use allocations or special designations.

Table 3-221. Closed OHV areas by alternative and by land use allocation or designation..

District/Field Office	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)	Alt. D (Acres)
Coos Bay				
Recreation Management Areas	102	101	101	1,234
Areas of Critical Environmental Concern	2,645	2,645	2,645	2,645
Protected Lands with Wilderness Characteristics	2,467	-	-	-
Subtotal	5,214	2,746	2,746	3,879
Eugene				
Recreation Management Areas	52	294	2,893	3,955
Areas of Critical Environmental Concern	20,513	20,515	20,497	20,905
Subtotal	20,565	20,809	23,390	24,860
Klamath Falls				
Recreation Management Areas	9	7,061	16,167	13,884
Areas of Critical Environmental Concern	607	470	470	470
Subtotal	616	7,531	16,637	14,354
Medford				
Recreation Management Areas	17,096	30,045	26,320	35,754
Areas of Critical Environmental Concern	916	916	916	916
Protected Lands with Wilderness Characteristics	83,079	50,670	50,670	-
Subtotal	101,091	81,631	77,906	36,670
Roseburg				
Recreation Management Areas	158	6,913	9,018	10,408
Areas of Critical Environmental Concern	3,675	3,675	3,675	3,675
Subtotal	3,833	10,588	12,693	14,083
Salem				
Recreation Management Areas	97	15,730	32,724	40,231
Areas of Critical Environmental Concern	6,294	6,294	5,690	6,294
Protected Lands with Wilderness Characteristics	2,524	58	58	-
Subtotal	8,915	22,082	38,472	46,525
Grand Total	**124,002**	**145,387**	**171,844**	**140,371**

In all action alternatives, the BLM would increase the acreage of areas *closed* to OHV use compared to the No Action alternative; this acreage increase totals 49,244 acres between alternatives, ranging from 128,757 acres in Alternative A to 178,001 acres in Alternative C. The total amount of *closed* area designation varies by alternative because of corresponding Areas of Critical Environmental Concern and Recreation Management Area designations. Even under the most restrictive alternative for OHV use (Alternative C), the BLM would close less than 1 percent of BLM-administered lands in the decision area to OHV use. This small increase in closed area designations would not measurably affect OHV opportunities when considering the overall planning area. However, it would result in a loss of site-specific OHV opportunities, while improving non-motorized recreational experiences in these areas.

In all action alternatives, the BLM would designate 330,000 acres that are currently open as either *limited* or *closed*. The reduction in acres open to OHV travel would not directly equate to a loss of OHV opportunities, this is because a majority of the areas that are currently *open*, and which would remain *open* under the No Action alternative, are located on steep, densely-forested terrain, which is not conducive to cross-country motor vehicle travel. For example, the BLM classifies only 7 percent of these currently open areas as non-forest habitat. For this reason, OHV use is generally *limited* to existing roads and trails due to conditions in these areas despite their current *open* designations. The existing routes that have shifted from *open* to *limited* would continue to be available to OHV use until route designations are completed through subsequent implementation-level Transportation Management Plans.

In all action alternatives, the BLM would designate a large percent of BLM-administered lands in the decision area as *limited* to existing roads and trails (**Table 3-220**) All action alternatives would designate as *limited* to existing roads and trails, at a minimum, a 51 percent increase from the No Action alternative. For the action alternatives, this change would reduce the amount of area designated as *limited* to designated roads and trails from 1,119,686 acres. Alternative A has the greatest number of acres in the *limited* to existing category followed by Alternatives B, D, and C respectively.

Effects from Recreation and Visitor Services Management

Improving OHV recreation under all action alternatives would primarily be accomplished through subsequent route designations within *limited* to existing areas, which identify specific roads and trails to provide OHV opportunities for the public. Designated routes would be improved or expanded to enhance visitor experiences or to meet increasing demand. Areas not designed or suitable for OHV use (or are only compatible for certain types of motor vehicles) are closed or restricted in order to reduce visitor conflicts and improve public safety.

An important differentiator among the alternatives is designation of some RMAs for exclusion of OHV use. The restrictions identify areas that would be designated for more primitive recreation opportunities. Closure acreages correspond proportionally to RMA total acreages by alternative. **Table 3-222** shows acres restricted to OHV recreation by alternative.

Table 3-222. Off-highway vehicle recreation opportunities, acres restricted within Recreation Management Areas.

Recreation Opportunities	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)	Alt. D (Acres)
Off-Highway Vehicle Use	17,517	49,969	87,261	105,474

Alternative A

Under Alternative A, nearly all of the decision area (98 percent) would be limited to existing OHV use until the BLM completed implementation level travel planning. Alternative A has the smallest amount of acreage closed to OHV use (128,757 acres, less than 1 percent). Under Alternative A, the BLM would not establish any Recreation Management Areas that emphasize motorized use. Compared to the No Action alternative, Alternative A would designate more areas as *closed* to OHVs and would designate more Recreation Management Areas for non-motorized trail use. Compared to Alternatives B, C, and D, Alternative A would restrict the fewest number of acres within RMAs as closed to motorized recreation. However, Alternative A would establish the highest proportion of RMAs as closed to motorized use (87 percent) when compared to the other action alternatives.

Alternative A would result in the eventual decrease of non-motorized recreation opportunities within the planning area due to the decrease in acres designated as RMAs for motorized recreation. Since RMAs provide targeted recreation experiences and protect unique recreation settings, visitors seeking motorized forms of recreation would experience reduced opportunities in Alternative A when compared to all Action Alternatives. In the long-term under Alternative A, as visitor use increases, conflicts between motorized and non-motorized visitors are expected to increase in popular use areas, resulting in lower quality recreation experiences for non-motorized/motorized visitors. User conflicts would continue to increase over the long-term, without a recreation setting established, and no management controls to separate uses.

Alternative B

Under Alternative B, most of the decision area (93 percent) would be *limited* to existing OHV use until the BLM completed implementation level travel planning. Alternative B has approximately 20,000 more acres closed to OHV use than Alternative A and fewer acres closed to motorized use than Alternatives C and D. The majority of these closures would occur within ACECs to protect relevant and important values and within RMAs to protect setting characteristics and provide for targeted recreation outcomes that are not compatible with the presence of motorized use. Alternative B would designate more RMAs for both motorized and non-motorized trail uses when compared to Alternative A. Compared to Alternatives C and D, Alternative B would restrict fewer acres within RMAs as *closed* to motorized recreation. Alternative B would establish the highest proportion of RMAs as c*losed* to motorized use (87 percent) when compared to the other action alternatives.

Under Alternative B, the most significant reduction in recreational OHV use occurs within the existing Timber Mountain OHV area. This RMA is located approximately 30 miles east of Medford, Oregon, on BLM-administered lands intermingled with privately owned lands. Approximately 375 miles of OHV trails and roads, within the 10,160 acres of the Timber Mountain RMA, would be *closed* to motorized recreation use under Alternative B; these acres would continue to be *limited* to existing under all other alternatives. Existing trails proposed as closed to OHV use on BLM-administered lands, are proposed for non-motorized recreation use (hiking, horseback riding, and mountain biking) under Alternative B. Implementation-level travel planning would include designation of the final non-motorized route system within the Timber Mountain RMA.

The current estimated visitor use levels for Timber Mountain RMA are 16,000 to 20,000 riders per year. This range is based on BLM recreation staff observations of OHV use since 2005 in the Timber Mountain RMA. Under Alternative B, the closure of the Timber Mountain RMA would result in a decrease of approximately 375 miles of motorized OHV roads and trails open to the public. The decrease in available miles of roads and trails for OHV use would likely result in a decrease in the quality of the experience for resident and non-resident OHV users who frequently use the area. This decision would negatively affect the approximately 16,000 to 20,000 annual visitors to the Timber Mountain RMA. Non-motorized trail based recreation users would see increased opportunities to recreate on the existing 375 miles of routes that would be closed to OHV use.

Designated motorized and non-motorized trail riding opportunities would be provided on public lands designated for motorized use under RMA designations. These designations would increase opportunities over the long-term compared to Alternative A by facilitating increased funding for motorized routes and trails and non-motorized trails. Public access to public lands would continue to be very restricted, so very limited motorized recreation opportunities would exist in these areas under all alternatives.

Alternative C

Under Alternative C, most of the decision area (92 percent) would be limited to existing OHV use until the BLM completed implementation-level travel planning. Alternative C has approximately 50,000 more acres *closed* to OHV use than Alternative A and fewer acres *closed* to OHV use than Alternatives C and D. The majority of these closures would occur within ACECs to protect relevant and important values and within RMAs to protect setting characteristics and provide for targeted recreation outcomes that are not compatible with the presence of motorized use. Alternative C would designate more RMAs for both motorized and non-motorized trail uses when compared to Alternative A. Compared to Alternative D, Alternative C would restrict fewer acres within RMAs to motorized recreation. Alternative C would establish 21 percent of RMAs as *closed* to motorized use. When compared to the other Action Alternatives, Alternative C closes less RMA acres then Alternative A and B and more than Alternative D. Motorized recreation opportunities would be available on 329,556 acres of RMAs, which is more acres compared to Alternatives A and B and less then Alternative D.

Increased visitation due to these new proposed RMAs would increase the use of roads and trails and would increase the demand for new travel opportunities. Managing new RMAs could constrain or restrict public access in certain recreation management zones. Special Recreation Management Areas targeting OHV and non-motorized trail-based recreation would provide the greatest benefit. In RMAs that are specially managed to accommodate OHV activities, visitors seeking non-motorized forms of recreation would be dissuaded from using these areas. If these visitors did engage in non-motorized activities within these emphasis areas, the quality of their experiences would be diminished because of the limited compatibility of their activity with OHV use. In general, however, OHV RMAs help segregate these user groups, resulting in an overall improvement in the quality of experiences for all visitors.

Non-motorized recreation visitors may find other locations to recreate, if competition occurs to ride or use the same area, or if sounds from OHV use intrude on the quality of the desired non-motorized recreation experience. Hikers and horseback riders may also be displaced if no designated areas exist for their preferred use, or if OHV use and OHV sound increase in the future.

Alternative D

In Alternative D, impacts would be similar to those identified in Alternative C. Alternative D provides the greatest number of RMAs that would provide OHV recreation opportunities. Under Alternative D, a total of 561,677 acres of RMAs would provide opportunities for OHV recreation within the decision area. This would result in an increase in acres of OHV areas as compared to the No Action alternative and Alternatives A, B, and C.

By emphasizing OHV use in these areas, there would eventually be an improvement in off-highway vehicle opportunities that would result from an increase in developments. This would result in more concentrated levels of OHV use within these areas and likely cause a reduction in dispersed OHV use on other BLM-administered lands. It is assumed that dispersed OHV use would decrease because riders would be attracted to greater opportunities within these managed areas that provide targeted OHV recreation opportunities.

Effects from Wildlife Management

Under all action alternatives, OHV use is prohibited within 330 feet of bald eagle and golden eagle nest sites during the breeding season. Under all action alternatives, OHV use would be prohibited within 660 feet of bald eagles and golden eagle nest sites in areas without forest cover or topographic relief.

Effects from Cultural Resource Management

The BLM would close cultural sites to visitation if the BLM determined that travel-related activity threatens cultural site integrity. Site-specific decisions to protect a threatened site will affect travel management opportunities in the short- and long-term. Compared to the No Action alternative, the action alternatives could have more long-term adverse effects on travel opportunities because access would be limited to protect cultural resources.

Effects from Visual Resource Management

Management to protect visual resources would restrict new routes or trail plans in areas identified for such development (some RMAs, for example). Visual Resource Management (VRM) classifications would affect the location of new transportation systems. The BLM would design projects to meet the objectives of the VRM class established in the RMP for the project area. The development of travel assets (roads, trails) would be compatible with VRM Classes III and IV. Transportation actions would be limited in VRM Class I and Class II areas. Alternative A has 147,245 acres designated VRM Class I and Class II and is the most restrictive to transportation asset development. Alternatives B and C have 111 and 115 acres respectively, designated as VRM Class I and Class II, resulting in slightly less of an effect to transportation asset development when compared with Alternative A. When compared to the other action alternatives, Alternative D is least restrictive to travel management based on VRM class designations. Alternative D has the least impact on future transportation asset development with only 63,684 acres designated VRM Class I and Class II.

Issue 2

How will the alternatives affect the use, maintenance, and condition of the BLM's transportation system?

Summary of Analytical Methods

The BLM used road ratios (feet/Mbf) developed for the 2008 RMP/EIS to estimate miles of new road construction required for the No Action alternative and all the action alternatives. These road ratios reflect different road requirements for different types of harvest. Uneven-aged management and thinning harvest types require more new road construction than the regeneration harvest type. The average road ratios (feet/Mbf) across all offices for uneven-age management harvest are 20 percent higher than the road ratios for regeneration harvest and the road ratios for thinning harvest are 70 percent higher than for regeneration harvest.

The BLM also computed road ratios (feet/Mbf) for thinning harvests, using six years (FY2007-FY2012) of harvest volume sold data and timber sale contract data, as a reasonableness check against the 2008 RMP/EIS road ratios. The BLM found the 2008 RMP/EIS ratios to be somewhat higher than the FY 2007-2012 computed ratios thus yielding perhaps a slightly overestimated new construction mileages for thinning harvests. The BLM has no similar new road construction data for either regeneration or uneven-aged management harvests.

The BLM assumed that current trends in road closures would continue into the future since road closure mileage may not be sensitive to harvest levels given that most BLM-administered lands are encumbered by reciprocal right-of-way agreements. In other words, even if the harvest level would indicate an opportunity for road closure, the BLM may not be able to accomplish these closures due to the need to protect reciprocal right-of-way holders' rights to use BLM-owned roads.

The BLM projected miles of road renovation and purchaser renovation value, miles of road improvement, and miles of road closure for each of the alternatives using six years (FY2007-FY2012) of harvest volume sold data and timber sale contract data. The BLM projected total miles of the road network utilized for each alternative using eight years (CY2005-CY2012) of BLM timber sale contract haul data. Analytical conclusions drawn for each alternative include:

- Miles of permanent and temporary new road construction
- Miles of permanent and long-term road closure
- Road network mileage changes
- Miles of road renovation and improvement
- Miles of the existing road network utilized
- Road maintenance fees collected as a percentage of annual maintenance need
- Value of purchaser renovation as a percentage of the BLM’s deferred maintenance backlog

The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014, pp. 127-130).

Affected Environment

Road Network Description

The following functional classifications describe the BLM’s western Oregon transportation system:

- Collector roads—Roads that primarily provide access to large blocks of public land, accommodate multiple uses, have BLM’s highest traffic volumes, and connect with state and county road systems
- Local roads—Roads that normally serve smaller areas than collectors, accommodate fewer uses, have lower traffic volumes, and connect with collectors or State and County road systems
- Resource roads—Roads that provide point access to public lands, typically exist for a single use, carry very low traffic volumes, and connect with local or collector roads

These classifications indicate the character of service the roads provide and the appropriate road maintenance intensity levels (i.e., from basic custodial care to annual scheduled and preventative maintenance programs). **Table 3-223** shows the distribution of functional classifications within the BLM’s western Oregon transportation system. Currently, slightly less than 5 percent of the transportation system falls into the “collector” classification, while about 21 percent of the system is “local,” and nearly 75 percent “resource.”

Table 3-223. Functional classification of roads within the decision area.

District/Field Office	Collector (Miles)	Local (Miles)	Resource (Miles)	Totals (Miles)
Coos Bay	186	408	1,302	1,896
Eugene	71	422	1,524	2,017
Klamath Falls	47	154	323	524
Medford	156	981	3,452	4,589
Roseburg	94	581	2,193	2,868
Salem	101	546	1,789	2,436
Totals	**655**	**3,092**	**10,583**	**14,330**

Total inventoried transportation system mileage has remained steady since 2007; there are currently 14,330 miles compared to 14,394 miles in 2007. Additionally, the BLM owns approximately 600 miles of non-inventoried roads, typically short (< 500’) logging spurs, within the boundaries of the decision area.

Eighty-one percent of the BLM transportation system has some form of surfacing (aggregate or bituminous surface treatment) with 97 percent built to a single lane width.

Road Network Condition

The overall replacement value (the current cost to rebuild the network from scratch) of the BLM transportation system exceeds $10 billion. Approximately 30 percent of the road mileage is in fair or poor condition, primarily due to depleted surfacing aggregate and worn-out minor culverts. Currently the deferred maintenance backlog exceeds $300 million. However, 85 percent of bridges and 97 percent of major culverts are in good condition.

Tables 3-224, **3-225**, and **3-226**, summarize western Oregon road, bridge, and major culvert condition data respectively.

Table 3-224. Road condition, mileage, replacement value, and deferred maintenance backlog.

District/Field Office	Road Condition	Mileage	Replacement Value	Deferred Maintenance
Coos Bay	Fair/Poor	397	$314 million	$20 million
	Good	1,499	$1.216 billion	$1 million
	Totals	1,896	$1.530 billion	$21 million
Eugene	Fair/Poor	537	$361 million	$23 million
	Good	1,480	$1.267 billion	$2 million
	Totals	2,017	$1.628 billion	$25 million
Klamath Falls	Fair/Poor	66	$47 million	$6 million
	Good	458	$241 million	$1 million
	Totals	524	$288 million	$7 million
Medford	Fair/Poor	1,540	$1.061 billion	$123 million
	Good	3,049	$2.016 billion	$4 million
	Totals	4,589	$3.077 billion	$127 million
Roseburg	Fair/Poor	1,176	$730 million	$85 million
	Good	1,692	$934 million	$5 million
	Totals	2,868	$1.664 billion	$90 million
Salem	Fair/Poor	575	$408 million	$46 million
	Good	1,861	$1.347 billion	$1 million
	Totals	2,436	$1.755 billion	$47 million
Totals	Fair/Poor	4,291	$2.921 billion	$303 million
	Good	10,039	$7.021 billion	$14 million
	Grand Total	**14,330**	**$9.942 billion**	**$317 million**

Table 3-225. Bridge condition, replacement value, and deferred maintenance backlog.

District/Field Office	Bridge Condition	Count	Replacement Value	Deferred Maintenance
All Offices	Fair/Poor	53	$34.5 Million	$7.1 Million
	Good	306	$249.9 Million	$1.5 Million
	Grand Total	**359**	**$284.4 Million**	**$8.6 Million**

Table 3-226. Major culvert condition, replacement value/deferred maintenance.

District/Field Office	Major Culvert Condition	Count	Replacement Value	Deferred Maintenance
All Offices	Fair/Poor	18	$1.8 Million	$1.2 Million
	Good	526	$57.3 Million	-
	Grand Total	**544**	**$59.1 Million**	**$1.2 Million**

Road Maintenance

The BLM is responsible for maintaining roads under the BLM's ownership. Maintenance provides for resource protection, safe accommodation of users, and protection of the government's investment. Road maintenance on BLM roads is primarily for timber management/extraction, recreation, and fire management activities.

Each year the offices identify and prioritize annual maintenance work. Currently the BLM maintains about 14 percent of the western Oregon transportation system each year. The miles of annual maintenance the BLM conducts has declined in recent years. From 2007 to 2013, annual maintenance mileage declined about 47 percent, from 3,926 miles in 2007 to 2,064 miles in 2013. Annual maintenance work ranges from aggregate surface blading and roadside brush removal, to pothole repair and culvert replacement. The BLM funds annual maintenance of roads from a combination of appropriated funds and a collected account. Commercial timber haul, both BLM and private, generates funds paid into the collected account based on a maintenance fee charged on a volume hauled and mileage used basis.

While appropriated funding has remained flat over the last two decades, the BLM's collected account has declined dramatically, from $8 million annually 25 years ago, down to only about $3 million annually currently. This reduction is due entirely to BLM's declining timber sale offerings since private use of the network has remained constant over the last two decades. This BLM funding shortfall creates a gap between annual maintenance need and actual annual maintenance expenditure resulting in a large and growing deferred maintenance backlog, currently exceeding $300 million.

Road Closure

There are times the BLM determines that a road closure or travel restriction may be warranted. The objectives of road closure are typically for safety or resource protection, such as to reduce sedimentation, restore hydrological processes, reduce total road maintenance cost, and reduce impacts to fish or wildlife habitat, botanical resources, or special areas. The BLM offices coordinate in advance with potentially affected reciprocal right-of-way permittees on decisions to close roads for the purpose of protecting permittee rights to use BLM-owned roads. Should permittees not concur on BLM proposed long-term or permanent closures, these proposals must be dropped, thus limiting the BLM's opportunities to reduce road densities.

The BLM currently has about 900 miles (6 percent) of the transportation system in a long-term decommissioned status. These are all resource roads that have been closed to vehicles and left in an erosion-resistant condition; they may be re-opened in the future as needed. Slightly more than half of these miles have a natural surface type.

Environmental Effects

New Road Construction

Timber harvest operations would require construction of additional resource roads under each of the alternatives. No new collector or local roads would be needed as this portion of the transportation network was fully built out decades ago. **Table 3-227** summarizes the estimated new permanent and temporary road construction by surface type for the first decade.

Table 3-227. First decade new road construction by road surfacing and status.

Alternative	Temporary Rock (Miles)	Temporary Natural (Miles)	Permanent Rock (Miles)	Permanent Natural (Miles)	Total (Miles)
No Action	76	272	514	88	**950**
Alt. A	32	89	157	33	**311**
Alt. B	71	187	362	68	**688**
Alt. C	78	229	424	75	**806**
Alt. D	27	72	128	27	**254**

In the first decade, total resource road new construction mileages range from 254 miles for Alternative D to 806 miles for Alternative C. Approximately 40 percent of new road miles are temporary for each of the alternatives.

In the first decade, new construction of permanent resource roads ranges from 155 miles for Alternative D to 499 miles for Alternative C. This represents 1.0 percent of the existing western Oregon road network for Alternative D and 3.3 percent for Alternative C. Approximately 85 percent of these new road miles are surfaced with aggregate for all of the alternatives, similar to the existing network. All new construction would be single lane width.

Table 3-228 contains a summary of the estimated new road construction by harvest type for the first decade.

Table 3-228. First decade new road construction associated with harvest methods.

Alternative	Regeneration Harvest (Miles)	Thinning Harvest (Miles)	Uneven-Aged Harvest (Miles)	Totals (Miles)
No Action	312	638	-	**950**
Alt. A	235	18	58	**311**
Alt. B	151	351	186	**688**
Alt. C	470	214	122	**806**
Alt. D	92	29	133	**254**

The amount of new construction attributable to each harvest type varies greatly between the alternatives; regeneration harvest ranges from 22 percent (Alt. B) to 76 percent (Alt. A), thinning harvest ranges from 6 percent (Alt. A) to 51 percent (Alt. B), and uneven age management harvest ranges from 15 percent (Alt. C) to 52 percent (Alt. D).

Tables 3-229 to **3-233** contain a summary of the estimated new permanent and temporary road construction by office and surface type for the first decade.

Table 3-229. No Action first decade new road construction by road surfacing and status.

District/ Field Office	Temporary Rock (Miles)	Temporary Natural (Miles)	Permanent Rock (Miles)	Permanent Natural (Miles)	Totals (Miles)
Coos Bay	27	40	67	6	140
Eugene	21	12	195	4	232
Klamath Falls	-	-	-	3	3
Medford	10	81	112	60	263
Roseburg	2	55	94	-	151
Salem	16	84	46	15	161
Totals	**76**	**272**	**514**	**88**	**950**

Table 3-230. Alternative A first decade new road construction by road surfacing and status.

District/ Field Office	Temporary Rock (Miles)	Temporary Natural (Miles)	Permanent Rock (Miles)	Permanent Natural (Miles)	Totals (Miles)
Coos Bay	11	15	26	2	54
Eugene	5	2	44	1	52
Klamath Falls	-	-	-	1	1
Medford	9	27	45	24	105
Roseburg	1	16	27	-	44
Salem	6	29	15	5	55
Totals	**32**	**89**	**157**	**33**	**311**

Table 3-231. Alternative B first decade new road construction by road surfacing and status.

District/ Field Office	Temporary Rock (Miles)	Temporary Natural (Miles)	Permanent Rock (Miles)	Permanent Natural (Miles)	Totals (Miles)
Coos Bay	20	30	50	4	104
Eugene	13	8	126	3	150
Klamath Falls	-	-	-	2	2
Medford	24	46	87	47	204
Roseburg	2	39	64	-	105
Salem	12	64	35	12	123
Totals	**71**	**187**	**362**	**68**	**688**

Table 3-232. Alternative C first decade new road construction by road surfacing and status.

District/ Field Office	Temporary Rock (Miles)	Temporary Natural (Miles)	Permanent Rock (Miles)	Permanent Natural (Miles)	Totals (Miles)
Coos Bay	27	40	67	6	140
Eugene	14	8	136	3	161
Klamath Falls	-	-	-	4	4
Medford	19	54	89	49	211
Roseburg	3	54	92	-	149
Salem	15	73	40	13	141
Totals	**78**	**229**	**424**	**75**	**806**

Table 3-233. Alternative D first decade new road construction by road surfacing and status.

District/ Field Office	Temporary Rock (Miles)	Temporary Natural (Miles)	Permanent Rock (Miles)	Permanent Natural (Miles)	Totals (Miles)
Coos Bay	9	9	15	1	34
Eugene	4	2	39	-	45
Klamath Falls	-	-	-	1	1
Medford	10	20	39	21	90
Roseburg	-	17	24	-	41
Salem	4	24	11	4	43
Totals	**27**	**72**	**128**	**27**	**254**

The Medford District would require more new permanent road construction than the other western Oregon offices for all harvest types and for each of the alternatives. The average road ratios (feet/Mbf) across all harvest types are about 2.5 times greater in Medford than the average of the other offices since Medford harvest volumes per acre are typically lower than the other offices. Medford accounts for 28 to 39 percent of the new road miles for each of the alternatives.

Road Closure

The BLM would accomplish both permanent and long-term road closures under each of the alternatives. **Tables 3-234 and 3-235** summarize estimated permanent and long-term road closures by surface type for the first decade. The BLM assumed that road closure mileages would be consistent across alternatives since even if the harvest volume projected for a given alternative would indicate an opportunity for road closure, the BLM may not be able to accomplish these closures due to the need to protect reciprocal right-of-way holders' rights to use BLM-owned roads.

Table 3-234. First decade permanent road closure, all alternatives.

District/Field Office	Rock (Miles)	Natural (Miles)	Totals (Miles)
Coos Bay	2	29	31
Eugene	4	38	42
Klamath Falls	-	-	-
Medford	1	7	8
Roseburg	-	10	10
Salem	1	1	2
Totals	**8**	**85**	**93**

Table 3-235. First decade long-term road closure, all alternatives.

District/Field Office	Rock (Miles)	Natural (Miles)	Totals (Miles)
Coos Bay	35	96	131
Eugene	49	4	53
Klamath Falls	-	9	9
Medford	-	10	10
Roseburg	7	75	82
Salem	27	61	88
Totals	**118**	**255**	**373**

Permanent road closures, aimed primarily at natural surface roads, would affect significantly less than 1 percent of the western Oregon road network in the first decade.

Long-term road closures, implemented at a 2:1 ratio of natural surface type to rock surface type, would increase the percentage of the BLM road network in a long-term closure status from its current 6 percent to 8 percent by the end of the first decade.

In the first decade, net permanent road mileage changes range from an increase of 62 miles for Alternative D to an increase of 406 miles for Alternative C. This represents a 0.4 percent increase in the existing western Oregon road network for Alternative D and a 2.7 percent increase for Alternative C.

Road Renovation and Road Improvement

The BLM will accomplish both renovation and improvement of existing roads needed for timber sale use under each of the alternatives to support anticipated use, provide for safety, and protect adjacent lands and resources.

Renovation consists of restoring a degraded road to its original design standard (e.g., replacing both worn out cross drain culverts and depleted rock surfacing). Improvement consists of upgrading the original design standard, e.g., adding cross drain culverts and rock surfacing to an existing natural surface road.

Table 3-236 summarizes the estimated existing road renovation and improvement for the first decade.

Table 3-236. First decade existing road renovation and improvement.

Alternative	Renovation (Miles)	Improvement (Miles)
No Action	6,667	311
Alt. A	3,669	223
Alt. B	5,098	287
Alt. C	7,495	526
Alt. D	2,685	161

In the first decade, road renovation mileages range from 2,685 miles for Alternative D to 7,495 miles for Alternative C, approximately 80 percent of which occurs on rock surface roads. Renovation of some roads will occur more than once in the first decade. Renovation tasks typically include roadside brushing, ditchline and culvert cleaning, culvert replacement, rock surface replacement, and pot hole patching on paved roads.

In the first decade, road improvement mileages range from 161 miles for Alternative D to 526 miles for Alternative C, virtually all of which will consist of rocking natural surfaced roads, thus increasing the percentage of surfaced roads by 1 percent to 3 percent from the current 81 percent.

Road Utilization, Maintenance, and Condition

Table 3-237 contains a summary of estimated road utilization by surface type for the first decade for each of the alternatives.

Table 3-237. First decade existing road utilization by surface type.

Alternative	Paved (Miles)	Paved (%)	Rock (Miles)	Rock (%)
No Action	2,667	191%	4,115	40%
Alt. A	1,666	120%	2,561	25%
Alt. B	2,222	159%	3,416	33%
Alt. C	3,734	268%	5,741	56%
Alt. D	1,206	87%	1,854	18%

In the first decade, rock road utilization percentages range from 18 percent for Alternative D to 56 percent for Alternative C. Similarly, the first decade paved road utilization percentages range from 87 percent for Alternative D to 268 percent (i.e., meaning each paved road mile will be used 2.68 times) for Alternative C.

Tables 3-238 and **3-239** summarize estimated road maintenance fee collections by surface type for the first decade for each of the alternatives. The BLM based these estimates on both road utilization ratios developed from eight years (CY2005-FY2012) of BLM timber sale road use activity, at a western Oregon scale, and BLM's current road maintenance fee rate schedule. Additionally, the tables compares maintenance fee collections to the annual maintenance need for roads as reported in the Facility Asset Management System (the BLM's constructed asset inventory).

Table 3-238. First decade road maintenance fee collections compared to annual maintenance (AM) need.

Alternative	Paved Roads ($)				
	Road Use (Mbf-Miles)	Maintenance Fee/Mbf-Mile	Maintenance Fee Collected	AM Need	Percent of AM Need
No Action	11.9 M	$0.71	$8.4 M	$80 M	10%
Alt. A	7.4 M	$0.71	$5.3 M	$80 M	6%
Alt. B	9.9 M	$0.71	$7.0 M	$80 M	9%
Alt. C	16.6 M	$0.71	$11.8 M	$80 M	15%
Alt. D	5.4 M	$0.71	$3.8 M	$80 M	5%

Table 3-239. First decade road maintenance fee collections compared to annual maintenance (AM) need.

Alternative	Rock Roads ($)				
	Road Use (Mbf-Miles)	Maintenance Fee/Mbf-Mile	Maintenance Fee Collected	AM Need	Percent of AM Need
No Action	5.4 M	$1.46	$7.9 M	$88 M	9%
Alt. A	3.4 M	$1.46	$4.9 M	$88 M	6%
Alt. B	4.5 M	$1.46	$6.6 M	$88 M	7%
Alt. C	7.5 M	$1.46	$11.0 M	$88 M	12%
Alt. D	2.4 M	$1.46	$3.6 M	$88 M	4%

In the first decade, rock road maintenance fee collection ranges from 4 percent of annual maintenance need for Alternative D to 12 percent for Alternative C; similarly, the first decade BST road maintenance fee collections range from 5 percent of annual maintenance need for Alternative D to 15 percent for Alternative C.

When combined with the BLM's other first decade sources of annual maintenance funding, which are common to each of the alternatives, 1) assumed annual maintenance appropriation of $63 million, and 2) private commercial timber haul maintenance fee collections of $25 million, the total amount available for annual maintenance expenditures for both rock and BST surfaced roads ranges from $95 million for

Alternative D (57 percent of annual maintenance need) to $111 million for Alternative C (66 percent of annual maintenance need).

Under all alternatives, the road utilization rates are insufficient to close the gap between annual maintenance expenditure and annual maintenance need, with the shortfall greatest for Alternative D and least for Alternative C. The BLM is likely to continue to accrue new deferred maintenance in the first decade under any of the alternatives. Given the higher utilization rates for paved roads relative to rock roads, new deferred maintenance would likely skew towards rock roads.

Table 3-240 contains a summary of the estimated value of timber sale purchaser renovation for the first decade for each of the alternatives. Additionally, the table compares renovation expenditures to the deferred maintenance backlog for roads as reported in the Facility Asset Management System (the BLM's constructed asset inventory).

Table 3-240. First decade renovation expenditures compared to the deferred maintenance (DM) backlog.

Alternative	Paved and Rock Surfaced Roads ($)				
	Total Harvest Volume (Mbf)	Renovation Expenditure/Mbf	Renovation Expenditure	Current DM Backlog	Percent of DM Backlog
No Action	3,995,556	$9.55	$38.2 M	$317 M	12%
Alt. A	2,486,143	$9.55	$23.7 M	$317 M	7%
Alt. B	3,316,594	$9.55	$31.7 M	$317 M	10%
Alt. C	5,573,610	$9.55	$53.2 M	$317 M	17%
Alt. D	1,800,457	$9.55	$17.2 M	$317 M	5%

Renovation expenditures will therefore reduce the BLM's $317 million deferred maintenance backlog. In the first decade, renovation expenditures range from 5 percent of the deferred maintenance backlog for Alternative D to 17 percent for Alternative C.

When combined with the BLM's deferred maintenance program assumed appropriation of $30 million, the only other first decade source of deferred maintenance funding, the total amount available for deferred maintenance expenditures on surfaced roads ranges from $47 million for Alternative D (15 percent of the deferred maintenance backlog) to $83 million for Alternative C (26 percent of the deferred maintenance backlog).

In the first decade, **net** deferred maintenance backlog changes are likely to range from a small increase for Alternative D to a small decrease for Alternative C. Across alternatives, reductions in the deferred maintenance backlog due to timber sale purchaser renovation expenditures and deferred maintenance program spending are largely offset by accruing new deferred maintenance generated by the gap between annual maintenance need and actual annual maintenance expenditure.

References

USDI BLM. 2014. Resource management plans for western Oregon planning criteria. Bureau of Land Management, Oregon/Washington State Office, Portland, OR. http://www.blm.gov/or/plans/rmpswesternoregon/plandocs.php.

Tribal Interests

Key Points

- An ongoing dialog between BLM representatives and designated Tribal representatives and their leadership produced the issues addressed here. A summary of Tribal listening sessions is included as Appendix Q and expands upon the issues in this section.
- A large portion of the Tribally-identified issues are covered under specific resource sections (e.g., Fisheries, Hydrology, Socioeconomics, Cultural Resources) though the effects specific to Tribal communities may differ due to the unique relationships that Tribes have with the landscape and resources on it. The BLM summarizes these unique, and often qualitative, effects here whereas the specific resource sections contain the quantitative technical analyses.

Issue 1

How would land management actions affect sacred sites and places of traditional religious and cultural importance?

Summary of Analytical Methods

The BLM described how continued management of sacred sites and places of traditional religious and cultural importance of which the BLM is aware would continue through tribal consultation and implementation of the National Historic Preservation Act (NHPA, 16 U.S.C. 470) as well as Executive Order 13007 – Indian Sacred Sites (1966).

The Planning Criteria provides more detailed information on analytical assumptions, which is incorporated here by reference (USDI BLM 2014, p. 167).

Background

The National Historic Preservation Act and the 36 CFR 800 regulations use the term “properties of traditional religious and cultural importance” to describe geographic places prominent in a particular group’s cultural practices, beliefs, or values that: 1) are widely shared within the group, 2) have been passed down through the generations, and 3) have served a recognized role in maintaining the group’s cultural identity for at least 50 years. Through NEPA, NHPA, and the 36 CFR 800 regulations, federal agencies are required to consult with potentially affected Tribes in order to identify and evaluate such places that Federal actions may affect.

EO 13007 defines sacred sites as “specific, discrete, narrowly delineated locations on Federal land that are identified by an Indian Tribe, or . . . authoritative representative of an Indian religion, as sacred by virtue of their established religious significance to, or ceremonial use by, an Indian religion.” A Tribal understanding or definition of sacred sites or sacredness in general is in contrast to federal definition. Specifically, a narrowly delineated space does not capture the inherent sacredness of the natural phenomena surrounding it.

Based on Federal definitions sacred sites are religious or spiritual places and are not limited by age. Places of traditional and cultural importance can be either secular or religious but are limited to being 50 years of age or older, under this definition. Different regulations require the BLM to consider these two types of sites but in both cases Tribes are the only ones able to identify what sites are important to them.

Therefore, consultation with Tribes is necessary to identify and evaluate these sites as well as to help determine how actions may affect the sites and how to resolve adverse effects.

Affected Environment

There are both sacred sites and places of traditional and cultural importance within the planning area. Tribes or individual Tribal members often keep the location of these sites private; therefore, the BLM does not have knowledge of all the sacred sites and places of traditional and cultural importance located on BLM-administered lands. The BLM manages those sites of which the BLM is aware in consultation with Tribes.

Environmental Effects

The BLM will continue to avoid or mitigate effects to those sacred sites and places of traditional cultural importance of which it has knowledge to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions by: 1) accommodating access to and ceremonial use of Tribal sacred sites by Tribal religious practitioners; and 2) avoiding adversely affecting the physical integrity of such sacred sites. Any potential effects to these sites would warrant consultation and involvement from the Tribe on how to avoid or mitigate effects. Under all alternatives, the BLM would consult with Tribes early in the project planning process in order to identify currently unknown sites or sensitive areas and subsequently mitigate effectsif necessary.

Issue 2

How would land management actions affect tribal plant collection, management, and use?

Summary of Analytical Methods

In the absence of data on specific plants of cultural interest and their locations on the landscape, a quantified analysis of the effects on plant collection, management, and use is not possible as part of the RMP process. Further site-specific analysis would take place during implementation of the RMP, as would early consultation with interested Tribes in the planning process. This is the best way to avoid or mitigate effects to Tribal plant collection, management, and use.

Multiple Tribes expressed a specific concern regarding the ability to manage for culturally-important plants within riparian areas. The Planning Criteria included the broader topic of Tribal plant collection and effects to culturally important plants within riparian areas as separate issues (USDI BLM 2014, p. 169) but they are now combined here under the broader topic of Tribal plant collection. While this analysis focuses on riparian areas, it is important to state that Tribal plant collection, management, and use is not limited to only riparian areas. Without identifying specific plants and associated types of management required, the analyses can only speak generally to how variation in riparian management across alternatives would affect culturally-important plants. Given that the objective of the Riparian Reserve is to contribute to the conservation and recovery of listed fish species and their habitats and provide for conservation of special status fish and other riparian-associated species, treatments within riparian areas are restricted.

The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is hereby incorporated here by reference (USDI BLM 2014, pp. 166 and 169).

Affected Environment

BLM-administered lands in western Oregon provide an abundant variety of plants that Tribal members collect and sometimes manage for traditional uses. Tribal members collect plant materials to make baskets, hats, regalia, tools, and other objects of Tribal culture, as well as for food and medicine. Particular plants require active management in order for them to produce the desired material product. Two common treatments used for management of culturally-important plants are prescribed fire and thinning of denser forested areas to promote the growth of shrubs and a diversity of other species.

The Coos Bay District has agreements with the Coquille Indian Tribe and the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians that allow collection of specific plants on designated BLM-administered lands. The BLM and other Tribes in western Oregon are currently working together to draft agreements for Tribal plant collection.

Environmental Effects

Under all alternatives, the BLM could permit prescribed fire within riparian areas for vegetation management to the extent that it conforms to the management objectives and direction for riparian reserves under each alternative. **Appendix B** contains more specific details on management in the Riparian Reserve.

Klamath Falls Field Office

In all alternatives, the Riparian Reserve along perennial and fish-bearing streams would be 150 feet each side of the stream channel in forested areas in the Klamath Falls Field Office east of Highway 97. Management direction includes:

- Thinning and other silvicultural treatments
- No mechanical treatments within 60 feet of the stream channel

In all alternatives, the Riparian Reserve along non-fish-bearing intermittent streams would be 100 feet each side of the stream channel in forested areas in the Klamath Falls Field Office east of Highway 97. Management direction includes:

- Thinning and other treatments to support large tree development
- No mechanical treatments within 35 feet either side of the stream channel

Decision Area Excluding the Klamath Falls Field Office

In Alternative A, the Riparian Reserve along fish-bearing streams and perennial non-fish-bearing streams would have an inner zone of 0-120 feet; on non-fish-bearing intermittent streams the inner zone is 0-50 feet. The BLM would not allow thinning within these inner zones. The outer zones for all fish-bearing and perennial non-fish-bearing streams would be 120 feet to one site-potential tree height and 50 feet to one site-potential tree height on non-fish bearing intermittent streams. The BLM would allow thinning in the outer zone for the purposes of providing wood to streams. Tree felling is limited to safety reasons and stream restoration activities. The BLM would not allow commercial thinning.

In Alternative B, the Riparian Reserve along fish-bearing streams and perennial non-fish bearing streams would have an inner zone of 0-60 feet; on non-fish bearing intermittent streams the inner zone is 0-50 feet. The BLM would not allow thinning within these inner zones with the exception of safety reasons, treatment of disease, or for dry forest resiliency. The outer zones for all fish-bearing and perennial non-fish bearing streams would be 60 feet to one site-potential tree height and 50-100 feet on non-fish-bearing intermittent streams. The BLM would allow thinning for development of understory plants and to increase diversity of riparian species.

In Alternative C, the Riparian Reserve along fish-bearing streams and perennial non-fish-bearing streams would have an inner zone of 0-60 feet; on non-fish-bearing intermittent streams, the inner zone would be 0-50 feet. The BLM would not allow thinning within these inner zones except for safety reasons, treatment of disease, or for dry forest resiliency. The outer zones for all fish-bearing and perennial non-fish-bearing streams would be 60-150 feet. The BLM would allow thinning for development of understory plants and to increase diversity of riparian species.

In Alternative D, the Riparian Reserve along all streams would have an inner zone of 0-120 feet. The BLM would not allow thinning within this inner zone except for safety reasons, in-stream restoration, treatment of disease, or for dry forest resiliency. The outer zone for all streams is 120 feet to one site-potential tree height. The BLM would allow thinning in the outer zone for the purposes of providing wood to streams and for fuel reduction in drier forests.

In conclusion, Alternatives B and C would be most conducive to the type of management needed for culturally-important plants in these areas because the management direction allows for the widest range of management practices.

Early consultation with Tribes prior to project implementation would identify those plants that are important for traditional uses, and the BLM could reduce or eliminate effects to these resources. Identifying plant-gathering locations can also reduce or eliminate effects by project design or mitigation.

Issue 3

How would land management actions affect the visibility of the historic Siletz reservation boundary?

Summary of Analytical Methods

For this analysis, the BLM compared the extent to which each alternative would be able to maintain a visible boundary between the BLM-administered lands and the historic Siletz reservation boundary. To do this, the BLM calculated the total linear miles of BLM-administered lands touching the historic reservation boundary minus the total number of linear miles of those same BLM-administered lands that are in land use allocations allowing clear-cutting. This analysis is based on the assumption that tree retention would allow the BLM to maintain a visible boundary, while harvest without tree retention would not.

The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014, p. 169).

Background

President Franklin Pierce signed an Executive Order on November 9, 1855 to create a permanent reservation for the Coast and Willamette Valley Tribes. The original “Coast Reservation” spanned from Cape Lookout in the north, the Siltcoos River in the south, and the eastern edge of Range 9 West, covering 1.1 million acres. A series of Executive Orders and Congressional Acts in 1865, 1875, and 1894 reduced the Coast Reservation quite significantly. The historic reservation boundary spans approximately

155 miles along its north, west, and southern boundaries. About 31 of those miles touch or go through BLM-administered lands.

Affected Environment

There is interest from Siletz Tribal members to be able to go to areas on the landscape and physically see the historic reservation boundary where feasible. The BLM does not currently have practices in place to maintain visibility along the 31 miles of the historic boundary that runs between the BLM and the historic Coast Reservation. However, there are patches of visibility that currently exist along this historic boundary. These patches occur in some areas where forested BLM-administered lands are adjacent to private clear-cut timber lands.

Environmental Effects

For all alternatives, only one land use allocation proposes clear-cutting within the decision area, the High Intensity Timber Area (HITA). All other land use allocations that allow timber harvest include the ability to retain "leave trees" that could be used to mark a boundary. Alternatives B and D do not have any of the HITA Land Use Allocation along the historic Coast Reservation boundary. Therefore, all 31 miles of BLM-administered lands touching that boundary would have the ability to retain leave trees during harvest activities.

In alternatives A and C, some lands with the HITA land use allocation touch the historic Coast Reservation boundary. In alternative A, 1.24 miles of HITA lands touch this boundary leaving over 29 miles available for leave tree retention. In alternative C, 10.12 miles of HITA lands touch the historic boundary leaving almost 20 of the 31 miles available for leave tree retention.

In conclusion, BLM-administered land touches approximately 20 percent of the historic Coast Reservation boundary. Alternatives B and D would allow all of those miles to retain leave trees in order to have a visible boundary for the historic reservation. Alternative A would allow 96 percent of those miles to retain leave trees and Alternative C would allow 67 percent of those miles to retain leave trees.

Issue 4

How would land management actions affect lamprey, fish, and fish passages?

Summary of Analytical Methods

Large wood, stream temperature, sediment, and water flow have the greatest influence on aquatic habitat and the ability of aquatic habitat to support fish populations. Analysis of the effects to fish and their habitat are addressed in the Fisheries section. Additionally, BLM road construction could contribute sediment delivery to streams and that analysis is covered in the Hydrology section.

The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014, pp. 49-55, 65-88, 166-167).

Affected Environment

Salmon, lampreys, and other fish are a traditional cultural food for Tribes with interests in the planning area, and their population decline is a concern for those Tribes. Data on lamprey within the planning area is largely unavailable, and while they are not a listed species, the reduction in populations is widely known.

Environmental Effects

The alternatives have very similar potential effects to salmon and lamprey. The Fisheries and Hydrology sections contain the analyses of the alternatives for effects to fish and water, respectively.

Implementation of any of the alternatives would not affect fish passages administered by the BLM within the decision area because 97 percent of the large culverts that serve as fish passage are in good condition. The majority of fish barriers within the planning area are on private lands.

Issue 5

How would land management actions affect migrating mule deer and resident deer and elk populations?

Summary of Analytical Methods

The BLM analyzed the effects to deer and elk based on the availability of high-quality forage habitat by alternative. The early-successional stage forests represent high-quality forage habitat for this analysis. Deer and elk populations rely on the shrubs and forbs available in this habitat type for survival and successful reproduction.

The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014, pp. 167, 201, 202).

Affected Environment

Multiple Tribes expressed interest and concern over declining populations of migrating mule deer as well as the resident deer and elk populations. Deer and elk are important to Tribes as a traditional food, for the traditional cultural practice of hunting, and for their place in the larger eco-system. Declining timber harvests on Federal land in western Oregon have reduced the amount of early- successional forests that the deer and elk rely upon for high-quality forage. The Wildlife section that is specific to Black-tailed Deer and Roosevelt Elk provides a more detailed description of the current picture of deer and elk populations within the planning area.

Environmental Effects

Under Alternatives A, B, C, and No Action, higher-quality forage habitat would increase substantially for deer and elk populations on BLM-administered lands in 50 years. This increase in habitat is correlated to the combination of size of the Harvest Land Base and the harvesting methods allowed in those alternatives, thus creating more early-seral habitat within the decision area. These four alternatives would thus improve conditions for this Tribally-important resource. In alternative D, the BLM contribution to higher-quality forage habitat would remain unchanged, if not decrease slightly over time. The Wildlife section contains analysis specific to black-tailed deer and Roosevelt elk, which provides a more thorough description of the effects by alternative.

Issue 6

How would land management actions affect historic trail routes?

Summary of Analytical Methods

The BLM considers historic trail routes as a type of cultural resource. The Cultural and Paleontological Resources section provides a description of the analytical methodology used to analyze effects to cultural resources and the results of that analysis. Historic trail routes also include, but are not limited to, those designated by Congress as National Historic Trails. The National Trails System section provides a more detailed analysis of National Historic Trails.

The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014, pp. 41-43, 167-168).

Affected Environment

Federal agencies and others have identified, recorded, and evaluated a portion of the historic trail routes within the planning area. These sites are linear features on the landscape and exist in a variety of conditions. The General Land Office (GLO) created some of the earliest documentation available for trails. Some Native American travel routes later turned into European settler travel routes, trails, or roads for the Forest Service and other Federal agencies, or railroad grades for hauling lumber, passengers, and freight. Some prominent trails such as the Oregon Trail are listed on the National Register of Historic Places. The Salem District has at least six recorded historic trails. In order to identify important historic trail routes, the BLM must consult with interested Tribes in addition to conducting research of historic records.

Environmental Effects

Identification, recordation, and evaluation of historic trail routes would help avoid or mitigate effects to historic trail routes. The BLM does not have all historic trail routes recorded and will need to consult with Tribes in order to identify trail routes important to them. The Cultural and Paleontological Resources section provides a more detailed analysis of effects to cultural resources.

Issue 7

How would land management actions affect neighboring Tribally-managed lands?

Summary of Analytical Methods

This issue touches upon many other issues analyzed in this chapter. Numerous land management actions could potentially affect neighboring Tribally-managed lands.

The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014, pp. 168).

Affected Environment

Tribally-managed lands exist throughout the planning area. Multiple Tribes have lands adjacent to BLM-administered lands. Some management actions or inaction may result in effects to neighboring lands. Effects to neighboring lands can stem from:

- Spread of invasive species
- Occurrence of wildfire
- Access to Tribally-managed lands or places of importance to Tribes

Additionally, the Coquille Forest, managed by the Coquille Tribe is "subject to the standards and guidelines of Federal forest plans on adjacent or nearby Federal lands, now and in the future" (Coquille Forest Act of 1996). This means that the final resource management plan that applies to the Coos Bay District will also apply to the Coquille Forest.

Environmental Effects

To the extent Tribal lands border BLM-administered lands, the effects listed above could occur and are explained further here. BLM management actions comprise only a portion of the potential affects to tribally managed lands. The effects to neighboring Tribally-managed lands also depends on the type of management taking place on those lands.

For invasive species, the BLM would continue to implement measures to prevent, detect, and rapidly control new invasive species infestations as well as use manual, mechanical, cultural, chemical, and biological treatments to manage invasive species infestations. For wildfire, the BLM intends to manage for fire resilient landscapes and suppress wildfire where it threatens health and human safety. Additionally, all alternatives include hazardous fuels reduction strategies to varying degrees. In general, BLM land management actions should not affect access to Tribally-managed lands, although alternatives with more roads would allow for more access, and alternatives with fewer roads would possibly limit access (**Table 3-241**). Therefore, the No Action alternative and Alternatives B and C would potentially provide the best access whereas Alternatives A and D would provide the least.

Table 3-241. Numbers of estimated new road and renovated or improved road by alternative.

Alternative	Total Estimated New Road Construction (Miles)	Total Estimated Road Renovation (Miles)	Total Estimated Road Improvement (Miles)
No Action	944	6,809	170
Alt. A	303	3,738	122
Alt. B	687	5,229	155
Alt. C	790	7,668	277
Alt. D	246	2,723	87

It is also important to note that Tribes have the ability to petition the Secretary of the Interior as authorized by Public Law 108-278, also known as the Tribal Forest Protection Act of 2004, to conduct activities to achieve land management goals for Federal land. These activities must be on BLM-administered lands adjacent to Tribal forestland, where the BLM-administered land poses threat of fire or disease or is in need of land restoration activities. Therefore, if BLM land management activities present a threat to neighboring Tribally-managed forestlands, the Tribes can request to take action to remedy the threat.

As noted above, the Coquille Tribe is required by law to manage the Coquille Forest "subject to the standards and guidelines of Federal forest plans on adjacent or nearby Federal lands, now and in the future." In other words, the approved RMP will directly affect how the Coquille Tribe can manage the Coquille Forest. The analysis of effects to BLM-administered lands of the alternatives generally reflects how these alternatives would affect the Coquille Forest.

Issue 8

What are the social and economic effects of land management actions on Tribal communities?

Summary of Analytical Methods

The Socioeconomics section looks at the social and economic effects of the alternatives on communities within the planning area. Since Tribes are distinct communities that have Tribal members who live within the planning area, they also would be subject to these effects. Issue 2 of the Socioeconomics section looks at how the alternatives affect economic activity derived from BLM-administered lands. In addition, as part of the development of the affected environment portion of Issue 5 of Socioeconomics, the BLM collected data and interviewed community representatives throughout the planning area. While only two of the seven Tribes participated in the interviews, the information was broadly useful.

The Planning Criteria provides more detailed information on analytical assumptions, methods, and techniques, and the geographic and temporal scales for all five socioeconomic issues presented (USDI BLM 2014, pp. 130-148).

Affected Environment

Federally-recognized Tribes within the planning area represent distinct communities, but are also subject to the economic conditions of the planning area. Issue 2 in Socioeconomics provides a detailed description of the current condition of employment, unemployment, and earnings in the planning area. Briefly, however, using employment as an example, since 2001, total employment in the planning area has grown by 7.2 percent. However, since 2007, which was the peak of economic activity before the 2007-2009 recession, employment is down by 3.3 percent. Generally, throughout the planning area, district model areas show positive employment growth since 2001 ranging from 2.7 percent in the Coos Bay area to 9.8 percent in the Salem-Portland MSA area. Klamath Falls (-2.7 percent) and Roseburg (-3.9 percent) are still down from their 2001 levels. All model areas are down from their peak in 2007, ranging from the deepest low in Roseburg (-10.7 percent) to a very modest low in Salem-Portland MSA (-0.1 percent).

Environmental Effects

The Socioeconomics section, particularly Issue 2, contains a full description of the socioeconomic effects of the alternatives. With respect to effects, all the alternatives except for Alternative D would result in an increase in BLM-based jobs and earnings compared to what would have been generated in 2012 in the absence of Secure Rural Schools payments (i.e., if earnings and jobs were just based on jobs and earnings derived from the BLM's actual management of the land in 2012).

Issue 9

How would land management actions affect water quality?

Summary of Analytical Methods
The analysis of water quality is in the Hydrology section. This analysis focuses mainly on sediment delivery and stream temperature.

The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014, pp. 65-89 and 168-169).

Affected Environment
Tribes have identified more than one issue surrounding water quality. Water quality is important as drinking water, as well as for fish and other aquatic species habitat.

Environmental Effects
The Hydrology analysis reveals that there is very little effect to water under all alternatives and that there is a modest difference between potential changes in stream temperature between the alternatives. The Oregon Department of Environmental Quality (ODEQ) regulates effects to drinking water and the BLM would remain compliant with those regulations. Under all alternatives, the BLM would:

- Maintain water quality and stream flows within the range of natural variability, to protect aquatic biodiversity, and provide quality water for contact recreation and drinking water sources;
- Meet ODEQ water quality targets for 303(d) water bodies with approved Total Maximum Daily Loads (TMDLs);
- Maintain high-quality water and contribute to the restoration of degraded water quality downstream of BLM-administered lands; and
- Maintain high-quality waters within ODEQ designated Source Water Protection watersheds.

Issues Considered but not Analyzed in Detail

How would land management actions affect Tribal resource collection of obsidian, chert, and other rocks and minerals for noncommercial purposes?

The decision areas does not contain any identified locations for obsidian collection; therefore, analysis of effects is not possible. Chert and other non-modified rocks and minerals (including obsidian) can be collected anywhere within the decision area, except developed recreation areas or where it is otherwise prohibited and posted per CFR 8365.1-5. In the absence of specific locations identified for collection, an analysis of effects is not possible.

References
USDI BLM. 2014. Resource management plans for western Oregon planning criteria. Bureau of Land Management, Oregon/Washington State Office, Portland, OR. http://www.blm.gov/or/plans/rmpswesternoregon/plandocs.php.

Visual Resources Management

Key Points

- Under all alternatives, visual resource quality will decline to some extent over time.
- Alternative D provides the greatest protection of visual resources within the decision area.
- Alternatives A, B, and C provide the least protection of visual resources within the decision area.

Issue 1

How would varying types and intensities of forestry management and other resource uses affect visual resource quality on BLM-administered lands in western Oregon?

Summary of Analytical Methods

The BLM performed an updated visual resource inventory within western Oregon. The BLM established updated Visual Resource Inventory (VRI) classes. The BLM evaluated the loss or protection of visual quality (scenic quality, sensitivity levels, and distance zones) by alternative as compared to the affected environment.

The BLM evaluated, by alternative, acres proposed for designation under each Visual Resource Management (VRM) class, and how these designations would affect existing visual resource quality. Specifically, the BLM evaluated the effects to visual resources by considering how the VRM designations would likely change the current acres in each VRI class over time. The BLM concluded that the alternative with the least acres designated as a VRM class lower than their VRI class would have the least effect to visual resources and the alternative with the most acres designated as a VRM class higher than their VRI class would have the greatest effect to visual resources.

The BLM assumed that where an area's VRM class matches its VRI class under any given alternative the area's existing visual resource quality would not diminish. For example, an area inventoried at a VRI Class IV and designated as VRM Class IV, would maintain its existing visual resource quality. Conversely, the BLM assumed that when the BLM designates an area as a VRM class higher than its VRI class, that the area's visual resource quality would diminish over time. For example, the BLM would expect the scenic quality of an area inventoried as VRI Class II but managed as VRM Class IV to diminish substantially over time, as VRM Class IV would allow for major modification of the area's high level of scenic quality.

Analysis Assumptions

For the purposes of this analysis, the BLM assumed that the following forest management activities are compatible with specific VRI class objectives (i.e., would not degrade the values to change the VRI class):

- Visual Resource Inventory Class II: Thinning could take place within VRI II areas without degrading their visual resource quality to an extent that would change their VRI class. Regeneration harvest could not take place in VRI Class II areas without degrading visual resource quality to an extent that would change their VRI class
- Visual Resource Inventory Class III: Thinning and regeneration harvest with retention could take place within VRI III areas without degrading their visual resource quality to an extent that would

change their VRI class. Clear-cutting could not take place in VRI Class III areas without degrading visual resource quality to an extent that would change their VRI class
- Visual Resource Inventory Class IV: All harvest types could take place within VRI Class IV areas without degrading their visual resource quality

The Planning Criteria provides more detailed information on analytical assumptions, methods, and techniques, and geographic and temporal scales, which is incorporated her by reference (USDI BLM 2014, pp.123-124).

Background

Visual Resource Management is a system for minimizing the visual impacts of surface-disturbing activities and for maintaining scenic values. The BLM's Visual Resource Management system consists of two distinct components:

- Visual resource inventory (VRI) classes (VRI Class I through VRI Class IV)
- Visual resource management (VRM) classes (VRM Class I through VRM Class IV)

VRI classes portray the existing quality of visual resources. Inventory classes do not establish management direction and the BLM does not use them as a basis for constraining or limiting surface-disturbing activities, except for the Class I Visual Resource Inventory class, as described below. The BLM assigns four inventory classes through the inventory process:

- **VRI Class I.** The BLM assigns this class to areas where the management goal is to preserve a natural landscape. This includes areas such as Wilderness Areas, Wilderness Study Areas, Wild And Scenic Rivers classified as wild, and other congressionally and administratively designated areas. Unlikely other VRI classes, VRI class I is assigned based on a preservation management objective, rather than on the existing state of the visual resources.
- **VRI Class II, Class III, and Class IV.** The BLM assigns these classes based on a combination of existing scenic qualities, sensitivity levels, and distance zones as documented through the inventory. Areas inventoried at a Class II have higher existing visual resource quality than do areas inventoried at a Class III or a Class IV. Areas inventoried at a Class IV have the lowest existing visual resource quality.

The BLM designates VRM classes through a resource management plan. Unlike VRI classes, which, with the exception of VRI I, represent an area's existing visual quality, VRM classes define how the BLM intends to manage an area's visual resources. This VRM class designation can vary from the VRI class designations, except for VRM Class I, which is automatically applied to VRI I areas. Chapter 2 contains a description of the management objectives and the allocation of Visual Resource Management classes.

Certain sustained-yield timber management regimes are more or less compatible with the range of VRM class designations. **Table 3-242** displays the level of compatibility for each VRM class compared to the High Intensity Timber Area (HITA), Low Intensity Timber Area (LITA) and Owl Habitat Timber Area (OHTA) management regimes and the No Action alternative (NA).

Table 3-242. Compatibility of sustained yield management regimes with VRM classifications.

Classification	HITA (Even-aged Management)	LITA/MITA/No Action (Two-aged Management)	OHTA/UTA (Uneven-aged Management)
VRM 1			
VRM 2			
VRM 3			
VRM 4			

Dark grey boxes indicate that the management regime would generally be incompatible.
Cross-hatched boxes indicate that the management regime may be compatible.
Light grey boxes indicate that the management regime would generally be compatible.

Affected Environment/Environmental Consequences

All surface-disturbing activities, regardless of the alternative or management action, would be subject to the management objectives of the underlying land use allocation. The visual resource contrast rating system analyzes the potential site-specific impacts of surface-disturbance and the facility design and placement. The BLM would design surface-disturbing activities and facilities to mitigate visual effects and conform to the area's designated VRM objective.

Degradation of visual qualities would primarily occur from surface-disturbing activities, such as those associated regeneration timber harvest occurring within the Harvest Land Base or with construction of roads. Effects on visual resources would also result from some actions proposed to manage other resources and uses. The BLM deemed that programs not addressed in this section have no, or negligible, potential to impact visual resources under any of the alternatives.

Table 3-243 shows the VRI acreage and **Figure 3-156** shows the VRI class distribution in the decision area.

Table 3-243. Visual Resource Inventory class distribution by district/field office.

District/Field Office	VRI Class II (Acres)	VRI Class III (Acres)	VRI Class IV (Acres)
Coos Bay	16,382	61,070	246,829
Eugene	60,556	123,517	126,977
Klamath Falls	6,584	14,992	192,496
Medford	293,850	210,068	301,954
Roseburg	71,759	102,000	249,805
Salem	103,920	66,769	227,666
Totals	**553,052**	**578,415**	**1,345,726**

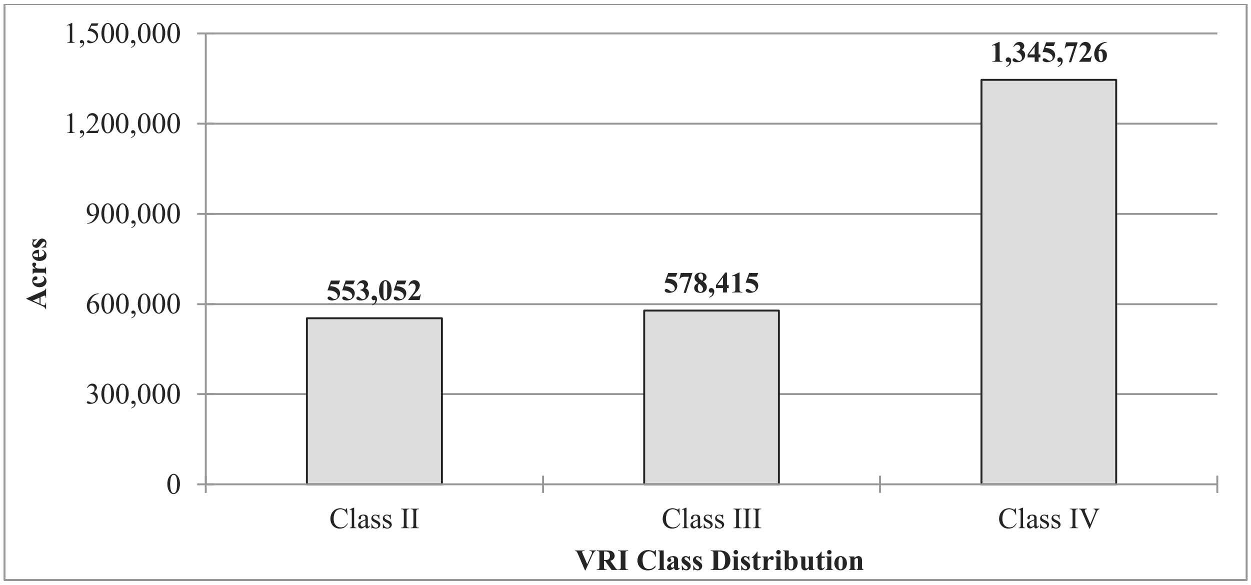

Figure 3-156. Visual Resource Inventory class distribution within the decision area.

Effects from VRM Designation

Table 3-244 shows the acres of the current VRI and designated VRM class under each alternative. Areas designated as VRM Class III or IV would allow more surface- and forest-disturbing effects and potentially have greater adverse effects on visual resources and scenic quality than those areas designated as VRM Class I or II. As described in the analytical methods section, the BLM assumed that current visual resource quality would degrade if the BLM designates areas as a VRM class higher than their VRI class.

Table 3-244. Acres of Visual Resource Inventory and Visual Resource Management classes by alternative.

VRM Class	VRI Class	No Action	Alt. A	Alt. B	Alt. C	Alt. D
Class I	N/A	22,165	21,131	21,131	21,131	21,131
Class II	553,052	125,220	135,869	99,749	99,790	58,397
Class III	578,415	633,537	30,137	34,339	34,246	1,048,902
Class IV	1,345,726	1,691,128	2,283,679	2,315,571	2,315,623	1,342,361
Unknown*	1,668	6,812	8,046	8,072	8,072	8,072
Totals	**2,478,862**	**2,478,862**	**2,478,862**	**2,478,862**	**2,478,862**	**2,478,862**

*Unknown acres result from GIS analysis resulting in small portions of slivering.

Under all alternatives, there would likely be a general decrease in visual quality in the decision area over time as the BLM would manage a substantial acreage of BLM-administered lands at a higher VRM class than the VRI class at which the acreage was inventoried (**Table 3-244**). Compared to the other alternatives, Alternative D would likely have the least decrease in visual quality as it has the fewest acres of land that are designated as a VRM Class that is higher than their VRI class.

No Action Alternative

Under the No Action alternative, the VRM classes set under the 1995 RMPs would continue. Under this continued management, there would be virtually no change to the visual character of areas designated VRM I. There would be an effect on the visual quality of the landscape in Class II areas. Ongoing resource use and development in areas managed as Class III and IV would have the potential to degrade visual resources.

The No Action alternative would result in a general decrease in visual quality in the planning area as a the number of acres within VRI Class III and Class IV would likely increase over time compared to the current condition (**Table 3-244**). However, this decrease would be slightly less in the No Action alternative compared with Alternatives A, B, and C, all of which would manage more acres than the No Action under VRM classes that are higher than their VRI classes. While Alternative D has fewer acres than the No Action alternative in VRM IV, it has substantially more acres in VRM III and fewer acres in VRM II. Of the alternatives, the No Action alternative is likely to have the least impact on visual resources.

Alternatives A, B, and C

In Alternatives A, B, and C, the BLM would manage visual resources on Congressionally reserved lands and ACECs according to their established class, except that the BLM would manage ACECs within the Harvest Land Base that are VRI II as VRM III. The BLM would manage all other lands as VRM Class IV, which would allow management activities that result in major modifications to the existing character of the landscape.

Alternatives A, B, and C would decrease the quality of visual resources within the decision area as a result of shifting VRI Class II to VRM Class III and IV, and shifting VRI Class III to VRM Class IV (**Table 3-245**). Under Alternatives A, B, and C, the BLM would manage 1,041,457 acres under a higher VRM class than the VRI class than at which they inventoried.

Table 3-245. Visual Resource Inventory class designations.

Alternatives VRM Management Class Designations		VRI Class I (Acres)		VRI Class II (Acres)		VRI Class III (Acres)		VRI Class IV (Acres)		VRI Unknown (Acres)	
No Action (Acres)		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
VRM I	22,165	-	-	11,413	2%	7,726	1%	2,752	>1%	273	16%
VRM II	125,220	-	-	67,506	12%	17,872	3%	39,743	3%	100	6%
VRM III	633,537	-	-	186,340	34%	218,511	39%	227,592	17%	1,094	66%
VRM IV	1,691,128	-	-	285,702	52%	333,010	57%	1,072,258	80%	157	9%
Unknown	6,812	-	-	2,091	>1%	1,296	>1%	3,381	>1%	44	3%
Totals	**2,478,862**	**-**	**-**	**553,052**	**100%**	**578,415**	**100%**	**1,345,726**	**100%**	**1,668**	**100%**
		Total acres with a lower VRI class than VRM Class								**1,019,335**	
Alt. A (Acres)											
VRM I	22,131	-	-	6,154	1%	5,236	>1%	-	-	273	16%
VRM II	135,869	-	-	52,293	10%	-	-	-	-	100	6%
VRM III	30,898	-	-	976	>1%	29,922	5%	-	-	1,094	66%
VRM IV	2,283,679	-	-	491,537	89%	541,962	94%	1,342,346	99%	157	9%
Unknown	8,046	-	-	2,091	>1%	1,296	>1%	3,381	>1%	44	3%
Totals	**2,478,862**	**-**	**-**	**553,051**	**100%**	**578,416**	**100%**	**1,345,727**	**100%**	**1,668**	**100%**
		Total acres with a lower VRI class than VRM Class								**1,041,457**	
Alt. B (Acres)											
VRM I	21,131	-	-	6,154	1%	5,236	>1%	-	-	273	16%
VRM II	99,749	-	-	49,032	9%	-	-	-	-	100	6%
VRM III	34,339	-	-	976	>1%	29,534	5%	-	-	1,094	66%
VRM IV	2,315,571	-	-	494,798	89%	542,350	94%	1,342,346	99%	157	9%
Unknown	8,072	-	-	2,091	>1%	1,296	>1%	3,381	>1%	44	3%
Totals	**2,478,862**	**-**	**-**	**553,051**	**100%**	**578,416**	**100%**	**1,345,727**	**100%**	**1,668**	**100%**
		Total acres with a lower VRI class than VRM Class								**1,041,457**	
Alt. C (Acres)											
VRM I	21,131	-	-	6,154	1%	5,236	>1%	-	-	273	16%
VRM II	99,790	-	-	49,073	9%	-	-	-	-	100	6%
VRM III	34,246	-	-	976	>1%	29,441	5%	-	-	1,094	66%
VRM IV	2,315,623	-	-	494,757	89%	542,443	94%	1,342,346	99%	157	9%
Unknown	8,072	-	-	2,091	>1	1,296	>1%	3,381	>1%	44	3%
Totals	**2,478,862**	**-**	**-**	**553,051**	**100%**	**578,416**	**100%**	**1,345,727**	**100%**	**1,668**	**100%**
		Total acres with a lower VRI class than VRM Class								**498,000**	
Alt. D (Acres)											
VRM I	21,131	-	-	6,154	1%	5,236	>1%	-	-	273	16%
VRM II	58,397	-	-	52,293	9%	-	-	-	-	100	6%
VRM III	1,048,902	-	-	480,729	87%	564,141	98%	-	-	1,094	66%
VRM IV	1,342,361	-	-	11,784	2%	7,743	1%	1,342,346	99%	157	9%
Unknown	8,072	-	-	2,091	>1%	1,296	>1%	3,381	>1%	44	3%
Totals	**2,478,862**	**-**	**-**	**553,051**	**100%**	**578,416**	**100%**	**1,345,727**	**100%**	**1,668**	**100%**

Alternative D

In Alternative D, the BLM would manage visual resources on Congressionally reserved lands and ACECs according to their established class, except that the BLM would manage ACECs within the Harvest Land Base that are VRI II as VRM III. The BLM would manage all other lands according to their VRI Class, except that in the Harvest Land Base, the BLM would manage lands inventoried as VRI Class II as VRM Class III.

While visual resource quality is likely to decline over time under Alternative D, the decline would be substantially less than under the other alternative. Under Alternative D only 489,000 acres at a VRM class that is higher than the VRI class at which they inventoried.

Effects to Visual Resources from Forest Management

Table 3-246 presents the acres of each VRI class that are in the Harvest Land Base under each alternative. Regeneration timber harvest would not diminish the existing visual quality of areas that are VRI IV. Areas inventoried as VRI Class II and VRI Class III have higher degrees of scenic quality and sensitivity levels and are typically more visible to the public than areas inventoried as Class IV. Clear-cutting would diminish the visual resource quality of both VRI Class II and VRI Class III areas, but regeneration harvest with retention would only diminish the visual resource quality of VRI Class II areas. It is worth noting that under all alternatives, the largest designated VRI Cass of the Harvest Land Base would be VRI Class IV; timber harvest would not degrade the visual quality of these areas.

Table 3-246. The Harvest Land Base within each Visual Resource Inventory class by alternative.

Visual Resource Inventory Classes	Harvest Land Base by Alternative (Acres)				
	No Action	Alt. A	Alt. B	Alt. C	Alt. D
Class I	-	-	-	-	-
Class II	174,030	69,785	116,425	141,535	133,680
Class III	209,996	82,103	117,755	154,676	168,159
Class IV	381,717	191,595	321,557	444,543	348,026
Unknown VRI	208	418	599	580	518
Totals	**765,951**	**343,901**	**556,336**	**741,334**	**650,383**

No Action Alternative

In the No Action alternative, effects to visual resources from sustained-yield timber management, all of which would include some level of retention, would occur on 173,030 acres. This would degrade the visual resource quality of 174,030 acres of VRI II Class lands. Timber harvest activities under the No Action alternative would affect visual resource quality on the second most acreage compared to other alternatives. The No Action alternative would affect visual resource quality on fewer acres than Alternative C, but on slightly more acres than alternatives A, B, and D.

Alternative A

In Alternative A, effects to visual resources from sustained-yield timber management regimes, including clear-cutting would occur on 151,888 acres. This would degrade the visual resource quality of 69,785 acres of VRI Class II lands and to a lesser extent of 82,103 acres of VRI Class III land. Timber harvest activities under Alternative A would impact visual resource quality on more acres than Alternatives B and D, but fewer acres than the No Action alternative and Alternative C.

Alternative B

In Alternative B, effects to visual resource from sustained-yield timber management regimes, including clear cutting would occur on 116, 425 acres. This would degrade the visual resource quality of 116, 425 acres of VRI II Class land. Timber harvest activities under Alternative B would affect visual resource quality on the least acreage of the alternatives.

Alternative C

In Alternative C, effects to visual resource from sustained-yield timber management regimes, including clear-cutting, would occur on 296,211 acres, resulting in the greatest impact of any action alternative.

This would degrade the visual resource quality of 141,535 acres of VRI Class II lands and to a lesser degree on 154,676 acres of VRI Class III lands. Compared with Alternative A, B, and D, Alternative B would have the greatest acreage affected by timber harvest activities. Timber harvest activities under Alternative C would affect visual resource quality on more acreage than the No Action alternative or than Alternatives A, B, and D.

Alternative D

In Alternative D, impacts to visual resource from sustained yield timber management activities, all of which would include some level of retention, would occur on 133,680 acres Timber harvest activities under Alternative D would impact visual resource quality on more acres than Alternatives B, but fewer acres than the No Action alternative and Alternatives A and C.

References

USDI BLM. 2014. Resource management plans for western Oregon planning criteria. Bureau of Land Management, Oregon/Washington State Office, Portland, OR. http://www.blm.gov/or/plans/rmpswesternoregon/plandocs.php.

Wildlife

Bald Eagle

Key Points

- All action alternatives would lead to an increase in bald eagle nesting habitat in 50 years.
- All action alternatives would have a slight loss of bald eagle habitat in the first decade or two, but additional habitat would develop in subsequent decades that would eventually surpass current conditions.

Background

Bald eagles (*Haliaeetus leucocephalis*), nest in large diameter trees within 2 miles of large, permanent water bodies (Isaacs and Anthony 2011).

There are 149 bald eagle nest trees amongst 89 breeding territories in the decision area (USDI BLM 2008). The number of occupied bald eagle breeding territories in Oregon increased from 65 in 1978, to 496 in 2007, and to 636 in 2010 (Isaacs 2011, Isaacs and Anthony 2011). Isaacs and Anthony (2011) suggest that the bald eagle population could double or triple before population growth stabilizes.

The bald eagle population in Oregon and along the lower Columbia River grew by 7.3 percent per year from 1978 to 2007 (Isaacs and Anthony 2011). Annual population growth from 2008 to 2010 was 3.5 percent per year (Isaacs 2011). The reduction in the rate of population growth may be an artifact of reduced monitoring effort between the two time periods since State-wide monitoring ended in 2007 (i.e., 96 percent of breeding areas were surveyed in the 1978 to 2007 period, whereas 67 percent were surveyed in the 2008-2010 period).

Under the 1995 RMPs, there are 176 Bald Eagle Management Areas designated in the decision area totaling 17,945 acres (**Table 3-247**), and they vary in size from three to 962 acres each. The 1995 RMPs included designations of Bald Eagle Management Areas to protect existing nest sites, winter and communal roosting areas, and potential nesting habitat.

Table 3-247. Bald Eagle Management Areas within the decision area.

District/Field Office	Bald Eagle Management Areas	Acres
Coos Bay	26	765
Eugene	73	8,254
Klamath Falls	21	1,921
Medford	20	1,057
Roseburg	25	3,731
Salem	11	2,217
Totals	**176**	**17,945**

The U.S Fish and Wildlife Service listed bald eagles as an endangered species under the Endangered Species Act on March 11, 1967 (32 FR 4001), reclassified as a threatened species July 12, 1995 (60 FR

36000), and delisted due to recovery on July 9, 2007 (72 FR 37346). Currently, bald eagles are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Under the Bald and Golden Eagle Protection Act, the BLM issued policy guidance directing analysis of impacts on bald eagles. The Analysis of the Management Situation for the RMPs for Western Oregon provides more information on the obligations of BLM for bald eagles under these acts, which is incorporated here by reference (USDI BLM 2013, p. 144).

Issue 1

What levels of habitat for the bald eagle would be available under each alternative?

Summary of Analytical Methods

In this analysis, the BLM considered nesting habitat for bald eagle to be mature forests with multi-layered canopy and structurally-complex forests within 2 miles of large water bodies (reservoirs or lakes greater than 10 acres or streams larger than 7th order). The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014, pp. 195-196).

This issue presents both an analysis of the direct and indirect effects of alternative implementation on bald eagle habitat in the decision area and an analysis of the cumulative effects on bald eagle habitat of past, present, and reasonably foreseeable future actions, including land management activities on BLM-administered lands and non-BLM-administered lands in the planning area. The BLM modeled habitat on non-BLM-administered lands within the planning area using the 2012 GNN structural condition. The discussion of analytical methods for the marbled murrelet describes GNN.

Affected Environment and Environmental Effects

There are 247,608 acres of nesting habitat for bald eagles on BLM-administered lands (**Figure 3-156**). Of the forested lands capable of providing nesting habitat, 36 percent is currently nesting habitat in the decision area.

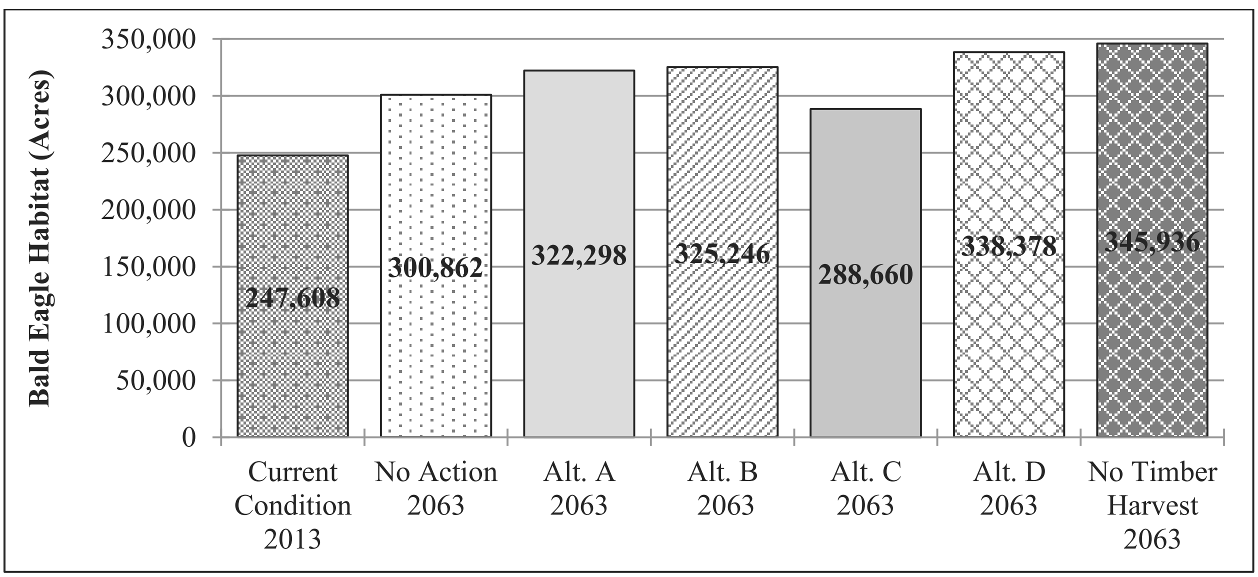

Figure 3-157. Bald eagle habitat in the decision area- current conditions and by alternatives in 50 years.

There are 1,146,747 acres of nesting habitat for bald eagles across all land-ownerships in the planning area (**Figure 3-158**). Of the forestlands capable of providing nesting habitat, 20 percent is currently nesting habitat in the planning area. BLM-administered lands currently provide 22 percent of the available nesting habitat for bald eagles.

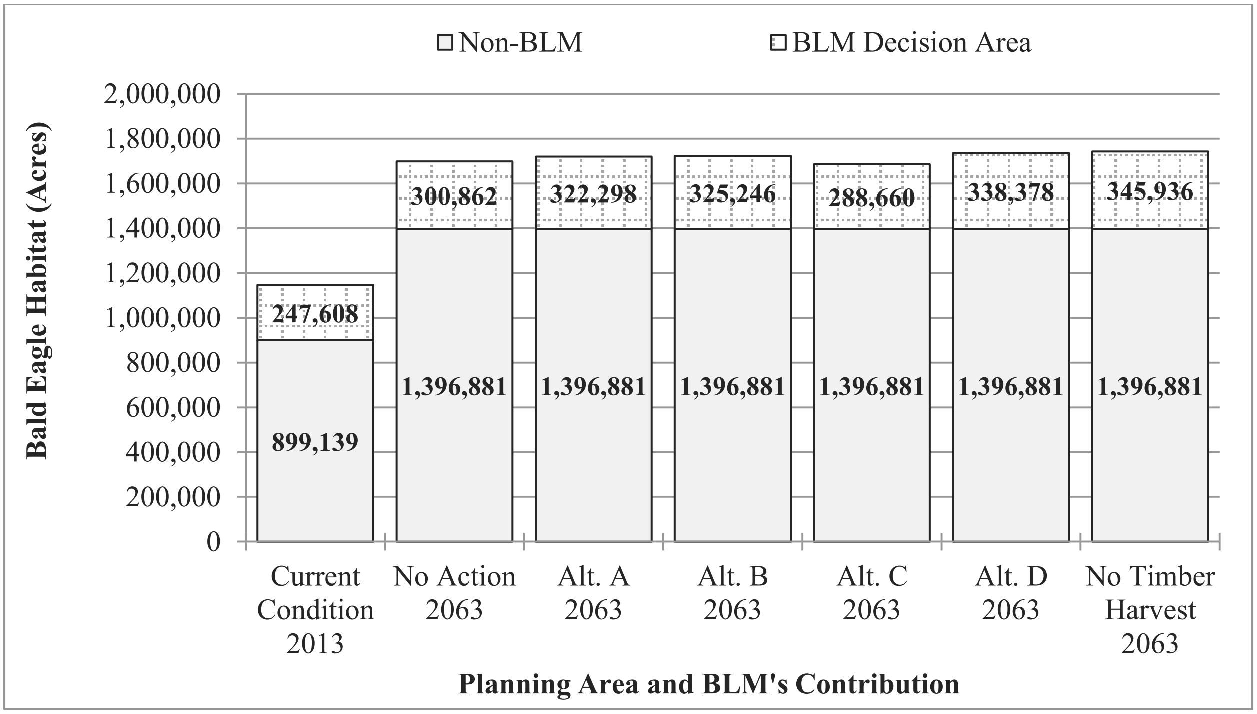

Figure 3-158. Bald eagle habitat in the planning area.

Under the No Timber Harvest Reference Analysis, there would be 345,936 acres of bald eagle nesting habitat in 50 years in the decision area (**Figure 3-158**). Under all action alternatives and the No Action alternative, the amount of bald eagle habitat on BLM-administered lands increases between 17 to 37 percent. Habitat development under the action alternatives would be 83 to 98 percent of the habitat development as under the No Timber Harvest Reference Analysis. Of the action alternatives, Alternative D would provide the most bald eagle habitat development and Alternative C would provide the least development. The No Action alternative would produce 87 percent as much habitat as under No Timber Harvest. The action alternatives would have a 1 to 4 percent loss of bald eagle habitat in the first decade (the first two decades for Alternative C and the No Action alternative), but additional habitat would develop in subsequent decades that would surpass current conditions (*Appendix R*).

At the planning area scale, the No Timber Harvest reference scenario would lead to 1,742,817 acres of bald eagle nesting habitat in 50 years (**Figure 3-158**). Bald eagle habitat would increase by 47 to 50 percent under the alternatives in 50 years in the planning area. Differences in habitat development among Alternatives A, B, and D would be indistinguishable since they are within one percent of the No Timber Harvest Reference Analysis. Alternative C and the No Action alternative would yield less bald eagle habitat at the planning area scale but the difference is insubstantial (three percent less than the No Timber Harvest Reference Analysis). The action alternatives would have > 1 percent loss of bald eagle habitat in the first decade (the first two decades for Alternative C and the No Action alternative), but additional habitat would develop in subsequent decades that would surpass current conditions (**Appendix R**).

Under all alternatives, the BLM would restrict activities near bald eagle nests that would disrupt nesting during the breeding season. Therefore, the BLM assumed that there would not be any disruption effects to nesting bald eagles under any of the alternatives.

Overall, the BLM expects bald eagle populations in the decision area and planning area to continue to grow under the No Action Alternative and the action alternatives. Habitat availability for bald eagles increases under the alternatives and there is no newly identified threat that BLM expects to curtail the observed trend (since 1978) in population growth of bald eagles. There would be little differentiation in effects among the alternatives, since habitat development would vary by no more than 3 percent among the alternatives and seasonal restrictions would avoid disruption of nesting under all alternatives.

Appendix R contains additional information and supporting data on bald eagles.

References

Isaacs, F. B. 2011. Summary of reports on bald eagles (*Haliaeetus leucocephalis*) nesting in Oregon and along the lower Columbia River, 2008-2010. Oregon Eagle Foundation, Inc., Klamath Falls, OR. http://www.fs.fed.us/r6/sfpnw/issssp/documents/inventories/inv-rpt-bi-hale-oregon-2008-2010-2011-07.pdf.

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Black-tailed Deer and Roosevelt Elk

Key Points

- Alternatives A, B, C, and the No Action alternative would increase the amount of high-quality forage habitat for deer and elk on BLM-administered lands in 50 years, but there would be an overall decrease in forage habitat in the planning area.

Background

Populations of black-tailed deer in western Oregon have been declining since the 1980s, based on Oregon Department of Fish and Wildlife information (ODFW 2014a). The Oregon Department of Fish and Wildlife estimates that the black-tailed deer population in Oregon declined from 452,000 animals in 1979, to 320,000 animals in 2004. Declines in the population of black-tailed deer are likely due to reductions in the quantity and quality of habitat, disease, and increased predation.

The current populations of Roosevelt elk (30,034 individuals) are below the management objectives established by the Oregon Department of Fish and Wildlife (42,900 individuals) in all nine wildlife management units reporting (ODFW 2014b).

The Oregon Department of Fish and Wildlife associates differences in habitat quality for black-tailed deer and elk with differences in forage quality and forest structural stages. Early-successional forests provide more diverse, abundant, and nutritious forage through the forbs and shrubs that grow for 10 to 15 years following a clear-cut or stand-replacing natural disturbance (ODFW 2008, 2014a). Black-tailed deer densities are higher in early-successional forests. The Oregon Department of Fish and Wildlife identifies availability of early-successional forest stages as a potential limiting factor for black-tailed deer (ODFW 2014a). These high-quality forage conditions persist until the canopy from regenerating conifer seedlings restricts sunlight to the low-lying forbs and shrubs.

Similarly, the Oregon Department of Fish and Wildlife identified that Federal forestlands in western Oregon are lacking in adequate forage conditions for elk due to drastic reductions in timber harvest under the Northwest Forest Plan (ODFW 2003). Summarizing results from the elk nutrition model by Rowland *et al.* (2013), White (2015) found lower canopy closure and higher elevation increases the abundance of high-quality forage for elk. Forage nutrition for elk in the Coast Range and many areas of the Cascades is relatively poor, and even in early-successional forest stages (e.g., clear-cuts), the nutritional value of the forage is below maintenance levels for lactating elk. However, early-successional forests provide much better nutritional benefits to elk than large areas of closed-canopy forest. Elk benefit from forest management activities that reduce forest cover, but usage of the additional forage that develops depends on nearby cover and human disturbance.

Issue 1

What levels of habitat for black-tailed deer and elk would be available under each alternative?

Summary of Analytical Methods

In this analysis, the BLM considered that all forested lands provide habitat for black-tailed deer and elk within the planning area. The BLM assumed that early-successional stage forest represents high quality forage habitat for deer and elk in this analysis. The BLM tested this assumption against the elk nutrition model by Rowland *et al.* (2013), and found that using the early-successional structural stage as high-quality forage habitat was reasonable.

This issue presents both an analysis of the direct and indirect effects of alternative implementation on black-tailed deer and Roosevelt elk habitat in the decision area and an analysis of the cumulative effects on black-tailed deer and Roosevelt elk habitat of past, present, and reasonably foreseeable future actions, including land management activities on BLM-administered lands and non-BLM-administered lands in the planning area. The BLM modeled habitat on non-BLM-administered lands within the planning area using the 2012 GNN structural condition.

The BLM did not model changes in the black-tailed deer or Roosevelt elk populations, because there are other factors that influencing populations outside the scope of BLM land management decisions, such as harvest levels of deer and elk authorized by Oregon Department of Fish and Wildlife and mortality from predators or vehicle collisions.

Affected Environment and Environmental Effects

There are 46,249 acres of high-quality forage habitat for deer and elk in the decision area (**Figure 3-159**), which is 2 percent of the 2,161,690 habitat-capable acres. There are 1,112,694 acres of high-quality forage habitat for deer and elk in the planning area (**Figure 3-160)**, which is 6 percent of the 17,403,114 habitat-capable acres. The BLM-administered lands contribute 4 percent of the available high-quality forage habitat available in the planning area.

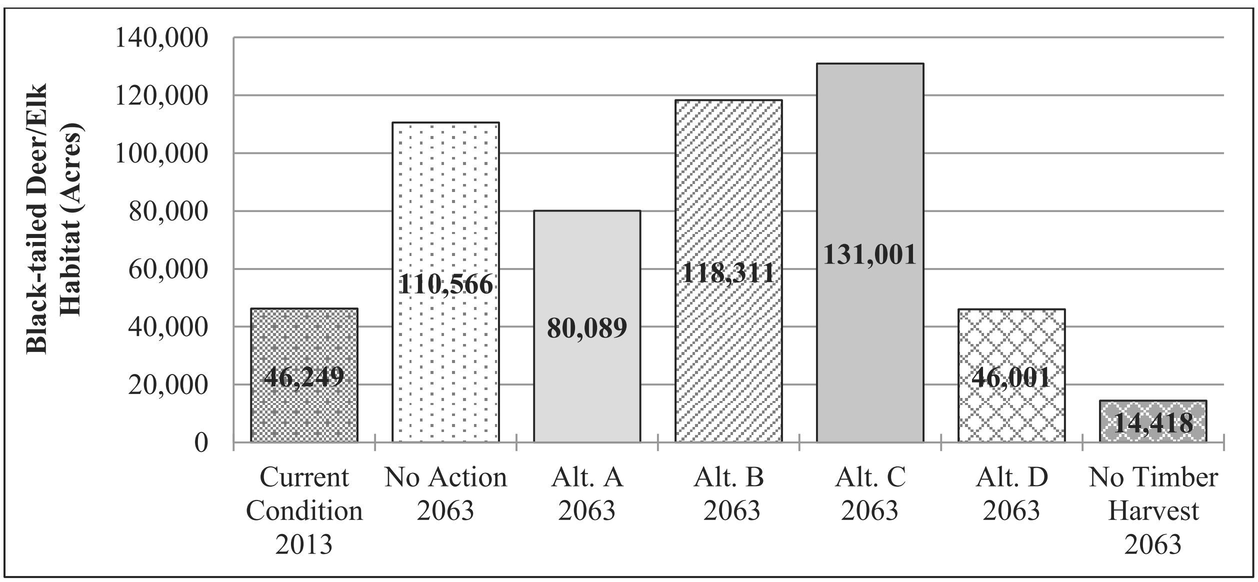

Figure 3-159. Black-tailed deer and Roosevelt elk high-quality forage habitat in the decision area.

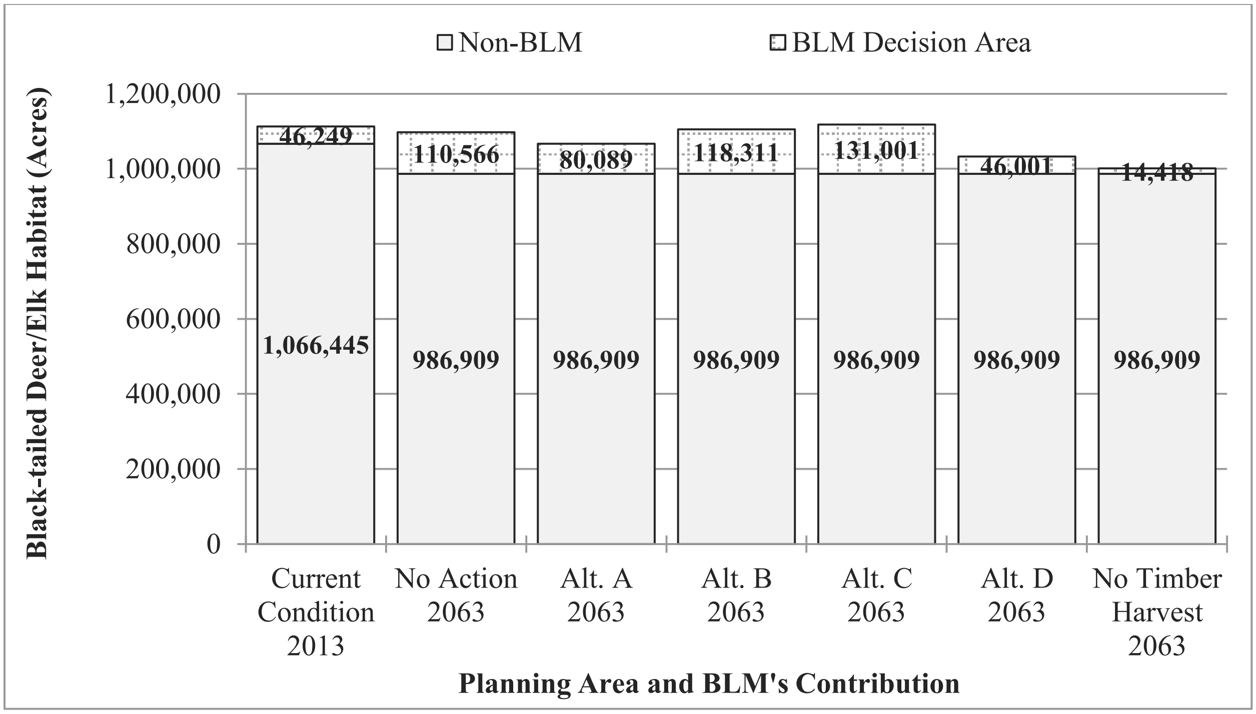

Figure 3-160. Black-tailed deer and Roosevelt elk high-quality forage in the planning area.

Under Alternatives A, B, and C, and the No Action alternative, high-quality forage habitat would increase substantially for deer and elk populations on BLM-administered lands in 50 years (**Figure 3-159**). Alternatives B, C, and the No Action alternative would provide two to three times as much high-quality forage habitat in 50 years than current amounts. Alternative A would double the amount of high-quality forage habitat in 50 years. The amount of habitat would be unchanged under Alternative D in 50 years. In contrast, the No Timber Harvest Reference Analysis would decrease the amount of habitat; in 50 years, there would be 31 percent of the current amount of high-quality forage habitat available.

At the planning area scale, Alternative C would maintain the amount of high-quality forage habitat for deer and elk. The other alternatives would lead to a 1 to 7 percent decrease in habitat (**Figure 3-160**). The No Timber Harvest Reference Analysis would reduce by 10 percent high-quality forage habitat for deer and elk. The reduction in high-quality forage habitat across all ownerships would be a result of the loss of early-successional habitat from lands in the reserve land use allocations of the BLM-administered lands and U.S. Forest Service lands, as these stands develop and mature. In 50 years, the BLM-administered lands would contribute 12 percent of the available high-quality forage habitat in the planning area, while the No Action alternative and Alternatives A and B would result in contributions of 10, 8, and 11 percent, respectively. Alternative D and the No Timber Harvest Reference Analysis would result in smaller contributions from BLM-administered lands to high-quality forage habitat in the planning area in 50 years (4 and 1 percent, respectively).

Alternatives A, B, and C, and the No Action alternative would increase the amount of high-quality forage habitat for deer and elk on BLM-administered lands in 50 years, but there would be an overall decrease in forage habitat in the planning area due to stand development in the reserve land use allocations on BLM-administered lands and Forest Service lands. Alternative D would maintain current amounts of high-quality forage habitat available in 50 years on BLM-administered lands. Increased availability of high-quality forage through early-successional structural stages would benefit deer and elk populations, since early seral habitats are required for maintaining productive ungulate populations (Cook *et al.* 2013). Greater availability of high-quality forage would improve ungulate survival and reproduction (e.g., pregnancy rates, fetal survival, neonatal survival, juvenile growth rates, vulnerability to overwinter starvation, and age at first breeding).

Appendix R contains additional information and supporting data on black-tailed deer and elk.

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Bureau Sensitive, Bureau Strategic, Survey & Manage Species, and Landbird Focal Species

Key Points

- All alternatives would lead to an increase in habitat for a majority of Bureau Sensitive, Bureau Strategic, Survey & Manage wildlife species, and landbird focal species in 50 years.
- Under all alternatives, the distribution of structural stages in the decision area in 50 years would be within the range of the average historic conditions, increasing the habitat availability for many Bureau Sensitive, Bureau Strategic, and Survey & Manage species.
- The lack of green tree retention or snag and down woody material retention under Alternatives A and C would lead to the least amount of habitat for species associated with legacy structures in younger stands in 50 years.
- Although none of the action alternatives would include the Survey & Manage standards and guidelines, there would be sufficient habitat to support stable populations for most of the Survey & Manage wildlife species under all alternatives.

Background

Within the planning area, there are 74 Bureau Sensitive wildlife species, 52 Bureau Strategic wildlife species, 28 Survey & Manage wildlife species, and 45 focal species of landbirds for consideration in this analysis (**Appendix R**).

Based on BLM Manual 6840, the BLM shall address Bureau Sensitive species and their habitats in land use plans and shall implement measures to conserve these species and their habitats, to promote their conservation, and reduce the likelihood and need for these species to be listed under the Endangered Species Act. Bureau Strategic species are not special status for management purposes (IM-OR-2012-018). The only requirement for this group of species is that information for species sites located during any survey efforts shall be entered into the BLM corporate database (GeoBOB). The BLM has the authority to update, amend, modify, change, or eliminate policies it uses to manage species within the Special Status Species program (USDA FS and USDI BLM 2004). The BLM updates its Special Status Species list on a regular schedule, when state heritage programs publish new rankings or when other information indicates a need.

The 2000 Final Supplemental EIS for Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines and the 2004 Final Supplemental EIS to Remove of Modify the Survey & Manage Mitigation Measure Standards and Guidelines discussed the origin and implementation of the Survey & Manage standards and guidelines and the need for changes to the standards and guidelines (USDA FS and USDI BLM 2000, pp. 3-10, 16-24; USDA FS and USDI BLM 2004, pp. 3-9, 15-21), and those discussions are incorporated here by reference.

Those two Supplemental EISs also described the Survey & Manage species and their habitat, distribution, and occurrence (USDA FS and USDI BLM 2000, pp. 213-394; USDA FS and USDI BLM 2004, pp. 141-208), and those descriptions are incorporated here by reference.

The 2012 Resource Management Plan Evaluation Report (USDI BLM 2012) summarized the history of proposed changes to the Survey & Manage standards and guidelines:

> *"The 1995 RMPs were amended by the January 2001, Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation*

Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents within the Range of the northern spotted owl.

In March 2004, the BLM completed a supplemental environmental impact statement and issued a record of decision to remove the Survey and Manage mitigation measure. The U.S. District Court for the Western District of Washington found the Record of Decision invalid since it relied on a supplemental environmental impact statement that the Court found deficient. In 2006, the Court issued an order of relief which allowed the BLM to eliminate the Survey and Manage requirement for four types of activities, commonly called the 'Pechman Exemptions.'

Another interagency supplemental environmental impact statement was prepared to address deficiencies in the 2004 supplemental environmental impact statement. The BLM issued a record of decision in July, 2007 to amend the plans within the Northwest Forest Plan area to remove the Survey and Manage mitigation measure.

In January 2008, a lawsuit was filed, and in December 2009, the presiding judge issued an Order granting Plaintiffs motion for partial summary judgment. The judge found that the SEIS violated NEPA due to a lack of a true No Action alternative; lack of new information warranting elimination of Survey and Manage; and lack of high-quality information and accurate scientific data related to fire and fuels treatments, costs, and species data.

A settlement agreement between the parties was approved by the court on July 6, 2011. The agreement stipulates that projects within the range of the northern spotted owl are subject to the survey and management standards and guidelines in the 2001 Record of Decision without subsequent 2001-2003 Annual Species Reviews as modified by the 2011 Settlement Agreement. The Settlement Agreement modifies the 2001 Survey and Manage species list; establishes a transition period for application of the species lists; acknowledges existing exemption categories (2006 Pechman Exemptions); and, establishes exemptions from surveys for certain activities. The settlement agreement is in effect until the BLM conducts further analysis and decision making pursuant to the National Environmental Policy Act and issues a record of decision to supersede the Survey and Manage mitigation measure.

The 2008 RMP revision did not include management objectives or direction for Survey and Manage Species. A plan revision would provide an opportunity to determine whether to retain, modify, or eliminate the Survey and Manage mitigation measure."

The Ninth Circuit Court of Appeals issued an opinion on April 25, 2013, that reversed the District Court for the Western District of Washington's approval of the 2011 Survey & Manage Settlement Agreement. On February 18, 2014, the District Court for the Western District of Washington issued a remedy order in the case of *Conservation Northwest et al. v. Bonnie et al.*, No. 08-1067- JCC (W.D. Wash.)/No.11-35729 (9th Cir.). This was the latest step in the ongoing litigation challenging the 2007 Record of Decision (ROD) to modify the Survey & Manage Standards and Guidelines.

The remedy order contained two components. The order—

a) Vacated the 2007 ROD to Remove or Modify the Survey & Manage Mitigation Measures Standards and Guidelines; and
b) Allowed for continued project planning and implementation for projects that relied on the 2011 Consent Decree that were being developed or implemented, on or before April 25, 2013 (the date of the Ninth Circuit Court ruling invalidating the 2011 Consent Decree).

The No Action alternative, as analyzed in this Draft EIS/RMP and described in Chapter 2, includes Survey & Manage measures, consistent with—

- The January 2001, Record of Decision and Standards and Guidelines for Amendments to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl;
- The 2001, 2002, and 2003 Annual Species Review modifications to the Survey & Manage species list, except for the changes made for the red tree vole; and
- The Pechman exemptions.

Direction in the Memorandum of Understanding between the BLM and U.S. Fish and Wildlife Service to promote the conservation of migratory birds (BLM MOU WO-230-2010-04) states that the BLM shall address the conservation of migratory bird habitat and populations when developing, amending, or revising management plans for BLM-administered lands.

Oregon-Washington Partners-In-Flight, American Bird Conservancy, and Klamath Bird Observatory have prepared a series of conservation plans for landbirds intended to inform planning efforts and habitat management actions (Altman and Alexander 2012). The strategy for achieving functioning ecosystems for landbirds is described through the habitat requirements of "focal species." By managing for a suite of species representative of important habitat attributes in functioning ecosystems, many other species and elements of biodiversity also could also be conserved. Inclusion of these focal species in the analysis could help inform what the differences in effects amongst the alternatives are for landbirds, as well as the habitat attributes and forest stages/ecosystems they represent.

Issue 1

What levels of habitat would be available under each alternative for Bureau Sensitive, Bureau Strategic, or Survey & Manage wildlife species and landbird focal species?

Summary of Analytical Methods

In this analysis, the BLM assumed that the structural stages used in the vegetation modeling represent habitat conditions for Bureau Sensitive, Bureau Strategic, or Survey & Manage wildlife species and landbird focal species; this modeling is based on structural stage output from the Woodstock model and using the analytical assumptions of habitat relationships described in **Appendix R**. Based on existing data, the BLM delineated a range for each species based on county boundaries and occurrences within the planning area. The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014, pp. 193-195).

The BLM combined the issues of habitat availability for Bureau Sensitive, Bureau Strategic, or Survey & Manage wildlife species, and landbird focal species into one issue, because the analytical procedures used were similar and the discussion of results would be similar for species with similar habitat associations (e.g., early-successional forest habitat development under the alternatives is the same, irrespective of a species' status).

In this analysis, the BLM did not assess the number of known sites by land use allocation or harvest scenario. This is a change from the analytical methodology described in the Planning Criteria (USDI BLM 2014, p. 194) because there is great disparity in survey efforts available among species, districts, and land use allocations. That is, survey efforts for these species have been biased in their location based on proposed land management projects. This disparity would not lend itself to an effects analysis that would be informative in discerning among the alternatives.

The BLM tabulated the amount of early-successional, stand establishment, young, mature, and structurally-complex forest habitats available in 50 years under the alternatives. **Appendix R** contains species-specific information regarding the effects of forest habitat development under the alternatives, as tabulated by the BLM.

This issue presents both an analysis of the direct and indirect effects of alternative implementation on habitat for Bureau Sensitive, Bureau Strategic, or Survey & Manage wildlife species and landbird focal species in the decision area and an analysis of the cumulative effects on habitat for Bureau Sensitive, Bureau Strategic, or Survey & Manage wildlife species and landbird focal species of past, present, and reasonably foreseeable future actions, including both land management on BLM-administered lands and non-BLM-administered lands in the planning area.

The BLM modeled non-forest habitat on BLM-administered lands using the 2012 GNN ecological systems description (LEMMA 2014). The BLM assumed that non-forest habitat would remain constant over time under the alternatives, because there is no management direction under any alternatives that would substantively alter the structural characteristics of such habitats.

The BLM calculated the average number of snags (trees per acre) and amount of down woody material (percent cover) per structural stage and structural group using data from BLM's current vegetation survey (CVS) plots. **Appendix R** contains snags and coarse woody debris values. The BLM did not model future snag or down woody material abundance on a per acre basis. However, the BLM assumed that early-successional, stand establishment, and young structural stages "with structural legacies" would provide greater amounts of snags and down woody material than those stages "without structural legacies" on BLM-administered lands. The BLM also assumed that mature and structurally-complex structural stages would provide snag and down woody material as habitat components for wildlife but did not distinguish among them for modeling purposes.

In this analysis, the BLM assumed that the effects of BLM management on special habitats, and the 116 Bureau Sensitive, Bureau Strategic, Survey & Manage, or landbird species that use them, would not differ amongst the alternatives. Under all alternatives, the BLM would manage naturally-occurring special habitats–seeps, springs, wetlands, natural ponds, streams, natural meadows, rock outcrops, caves, cliffs, talus slopes, mineral licks, oak savannah/woodlands, sand dunes, and marine habitats–to maintain their ecological function. The BLM would manage human-made special habitats–bridges, buildings, quarries, pump chances/heliponds, abandoned mines, and reservoirs–as special habitats when compatible with their engineered function. The Planning Criteria provides more detailed information on the 116 wildlife species that are associated with special habitats, which is incorporated here by reference (USDI BLM 2014, pp. 198-199, 213-225).

Affected Environment and Environmental Effects

On BLM-administered lands, forest habitat currently occupies 96 percent of the decision area. Young forest habitat is the most prevalent type of habitat (28 percent), with slightly smaller acreages of structurally-complex forest and mature forest habitat. Forests in the stand establishment stage are less abundant (17 percent), and early-successional habitat is the least abundant (2 percent) on BLM-administered lands. **Table 3-248** displays the acreages of non-forest, early-successional forest, stand establishment forest, young forest, mature forest, and structurally-complex forest habitat in the decision and planning areas.

For all ownerships, young forest is the predominant habitat stage comprising 45 percent. Early-successional forest habitat is the least abundant habitat stage at 5 percent, and 18 percent is currently mature or structurally-complex forest.

Table 3-248. Current condition in 2013 of habitat expressed by structural stage.

Structural Stage	BLM-administered Lands		All Ownerships	
	(Acres)	(Percentage)	(Acres)	(Percentage)
Non-Forest Habitat	91,752	4%	4,342,361	20%
Early-successional Habitat	46,249	2%	1,112,694	5%
Stand Establishment Habitat	388,767	17%	2,473,304	11%
Young Forest Habitat	622,916	28%	9,807,038	45%
Mature Forest Habitat	515,324	23%	2,431,709	11%
Structurally-complex Habitat	588,435	26%	1,578,370	7%
Totals	**2,253,442**	**100%**	**21,745,475**	**100%**

The 2008 RMP/EIS summarized the average historical conditions of forest structural stages in Western Oregon from Nonaka and Spies (2005), which is incorporated here by reference (USDI BLM 2008, pp. 211-212). The summarization of average historical conditions from the 2008 RMP/EIS combined the stand establishment and early-successional stages described in this Draft RMP/EIS into a single stage of “stand establishment.” This characterization of average historical conditions correlates to 5 percent stand establishment, 15 percent young, 25 percent mature, and 55 percent structurally-complex, respectively, and is displayed in **Figures 3-161** and **3-162**.

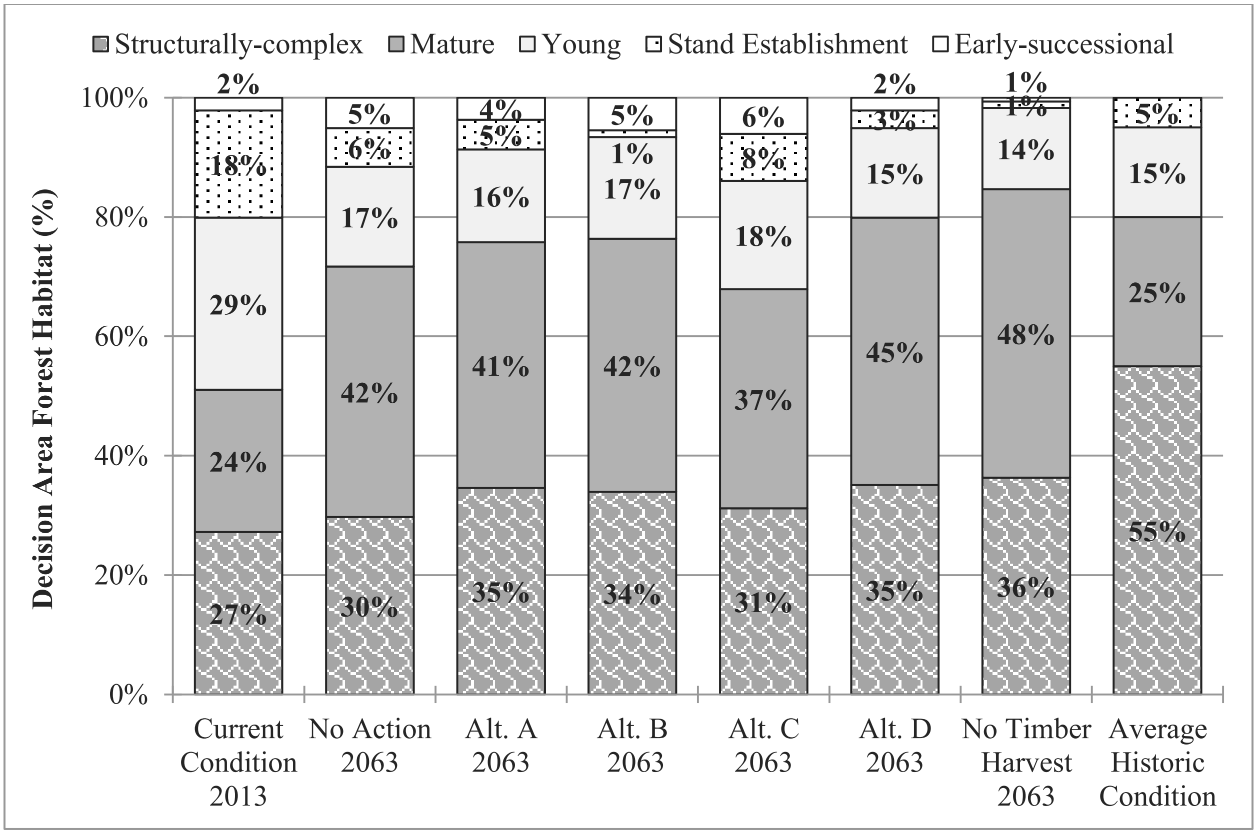

Figure 3-161. Structural stage development in the decision area compared with average historic condition.

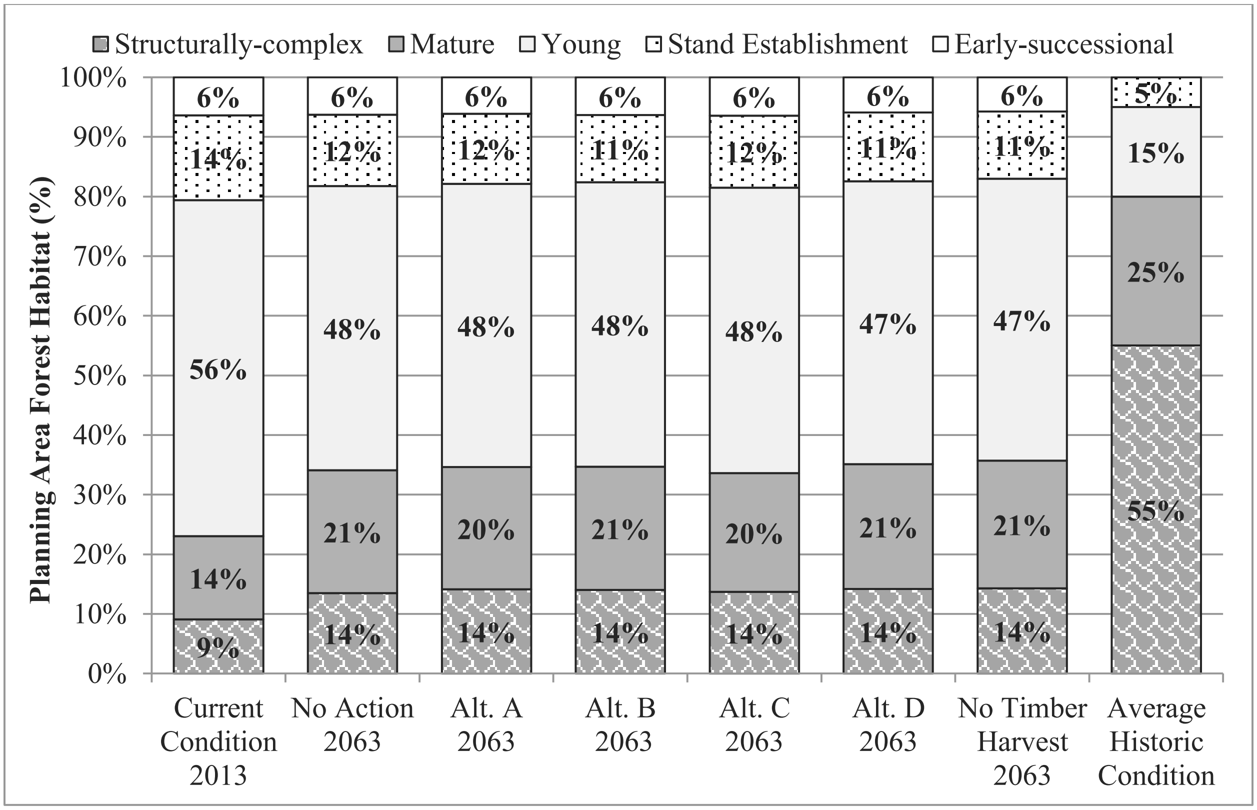

Figure 3-162. Structural stage development in the planning area compared with average historic condition.

Compared against the average historic conditions, the current combined amount of mature and structurally-complex forest in the decision area (51 percent) is less than the average historical condition (58-80 percent) (**Figure 3-161**). The prevalence of young and stand establishment stands is greater in the decision area than average historic conditions. Under all alternatives, the combined amount of mature and structurally-complex forest habitat in the decision area in 50 years (68-80 percent) would be within the range of the average historic conditions, as would the amount of young and stand establishment forests. In 50 years, the amount of mature and structurally-complex forest in the decision area under the No Timber Harvest Reference Analysis (84 percent) would exceed the average historic condition.

At the planning area scale, the amount of mature and structurally-complex forest currently (23 percent) is substantially less than the average historical condition (58-80 percent) (**Figure 3-162**). There is a preponderance of young forest (56 percent) that is well above the average historic condition (15 to 21 percent). However, the amount of stand establishment forest in the planning area currently (21 percent) is currently near average historic condition (5 to 17 percent). In 50 years, the all alternatives would move the distribution of structural stages towards the average historic conditions, but there would still be successional considerable disparity.

Structurally-complex forest habitat in the decision area would increase from 27 percent of the 2,161,690 habitat-capable acres to 36 percent of the habitat-capable acres under the No Timber Harvest Reference Analysis in 50 years (**Figure 3-161**). Under Alternatives A, B, and D, there would be little difference in the development of structurally-complex forest habitat, as it would increase from 27 percent of habitat-capable currently to 35, 34, and 35 percent of habitat-capable, respectively, in 50 years. Alternative C and the No Action alternative would result in the least amount of structurally-complex forest in 50 years (31 and 30 percent of habitat-capable respectively) but would still represent an increase over current conditions (27 percent of habitat-capable). Of the current structurally-complex forest in the planning area, 37 percent is on BLM-administered lands. In 50 years, the contribution of BLM-administered lands to structurally-complex forest habitat in the planning area would increase to 27 to 31 percent under the alternatives, as additional non-BLM-administered lands, especially Reserves on U.S. Forest Service lands, develop into structurally-complex forest habitat.

Mature forest habitat in the decision area would increase from 24 percent of the 2,161,690 habitat-capable acres to 48 percent of the habitat-capable acres under the No Timber Harvest Reference Analysis in 50 years (**Figure 3-161**). Under Alternatives A, B, D, and the No Action alternative, there would be little difference in the development of mature forest habitat as it would increase from 24 percent of habitat-capable currently to 41, 42, 45, and 42 percent of habitat-capable, respectively, in 50 years. Alternative C would result in the least amount of mature forest development in 50 years (37 percent of habitat-capable) but would still represent an increase over current conditions (24 percent of habitat-capable). Of the available mature forest in the planning area, 21 percent is currently on BLM-administered lands and that proportion would increase to 23-27 percent under the alternatives (including the No Action alternative) as additional non-BLM-administered lands mature.

Young forest habitat in the decision area would decrease from 29 percent of the 2,161,690 habitat-capable acres to 14 percent of the habitat-capable acres under the No Timber Harvest Reference Analysis in 50 years (**Figure 3-161**). Under the action alternatives and the No Action alternative, there would be little difference in the loss of young forest habitat, as it would decrease from 29 percent of habitat-capable currently to 15-18 percent of habitat-capable in 50 years. Alternative C would result in the least reduction of young forest in 50 years (18 percent of habitat-capable) but would still represent a decrease below current conditions (29 percent of habitat-capable). Of the available young forest in the planning area, 6 percent is currently on BLM-administered lands and that proportion would decrease slightly to 4-5 percent under the alternatives (including the No Action alternative) as BLM-administered lands continue to develop and mature.

Stand-establishment forest habitat in the decision area would decrease from 18 percent of the 2,161,690 habitat-capable acres to 1 percent of the habitat-capable acres under the No Timber Harvest Reference Analysis in 50 years (**Figure 3-161**). Under the action alternatives and the No Action alternative, the amount of stand establishment forest habitat would decrease from 18 percent of habitat-capable currently to 1-8 percent of habitat-capable in 50 years. Alternative C would result in the least reduction of young forest in 50 years (8 percent of habitat-capable), while Alternative B would result in the largest reduction in 50 years (1 percent of habitat-capable). Of the available stand establishment forest in the planning area, 16 percent is currently on BLM-administered lands and that proportion would decrease to 1-8 percent under the alternatives, as BLM-administered lands continue to develop and mature.

Early-successional forest habitat in the decision area would decrease from 2 percent of the 2,161,690 habitat-capable acres, to 1 percent of the habitat-capable acres under the No Timber Harvest Reference Analysis in 50 years (**Figure 3-161**). Under all action alternatives and the No Action alternative, the amount of early-successional forest habitat would increase in abundance in 50 years. Alternative D would result in the smallest increase of early-successional forest habitat in 50 years (2 percent of habitat-capable), and Alternative C would result in the greatest development of early-successional forest habitat (6 percent of habitat-capable). Alternatives A and B, and the No Action alternative would result in 4, 5, and 5 percent, respectively, of habitat-capable in an early-successional condition in 50 years. Of the available early-successional forest in the planning area, 4 percent is currently on BLM-administered lands and that proportion would increase to 4-12 percent under the alternatives, as regeneration timber harvest occurs on BLM-administered lands.

At the planning area scale, there would be little difference (less than 1 percent) in the distribution of structural stages in 50 years among the alternatives or the No Timber Harvest Reference Analysis (**Figure 3-162**). Currently, within the planning area, 9 percent is structurally-complex, 14 percent is mature, 56 percent is young, 14 percent is stand establishment, and 6 percent is early-successional. In 50 years within the planning area, there would be 14 percent structurally-complex, 21 percent mature, 48 percent young, 12 percent stand establishment, and 6 percent early-successional. The proportion of structural stages would vary by 1 percent or less among any of the alternatives.

Overall, Alternatives A, B, and D would lead to the development of the greatest amount of structurally-complex and mature forest habitats, and Alternative C would lead to the greatest development of early-successional, stand establishment, and young stands (**Figures 3-161** and **3-162**). **Appendix R** provides more detailed information on the development of structural stages in the decision and planning areas by decade through 2063.

Current snag density is greater in mature and structurally-complex stands (28.1 and 19.8 snags per acre, respectively) than in early-successional, stand establishment, and young stands (15.7, 7.8, and 18.1 snags per acre respectively, **Appendix R**). Similarly, the amount of down woody material in mature and structurally-complex stands (5.0 and 4.9 percent cover, respectively) is greater than in early-successional, stand establishment, and young stands (3.8, 4.1, and 3.6 percent, respectively). The abundance of snags and down wood also is greater in the coastal/north (22.0 snags per acre and 5.2 percent cover in the Coos Bay, Eugene, and Salem Districts) than in the interior/south (16.1 snags per acre and 3.7 percent cover in the Medford and Districts, and the Klamath Falls Field Office). The more frequent wildfire return interval and greater wildfire intensity in the interior/south likely is responsible for this observed trend, as more fires consume more of the dead woody material.

Under all alternatives, habitat abundance would increase for at least 83 percent of species associated with young, mature, or structurally-complex forests in 50 years (**Table 3-249**).

Table 3-249. Habitat effects summary to Bureau Sensitive, Bureau Strategic, and Survey & Manage wildlife species, and to landbird focal species* based on structural stage association.

Alternative	Number of Species* That Would Have an Increase in Habitat by 2063 by Structural Stage Association (Percent of Species in Group)						
	Early-successional (n=17)	Young or Mature (n=6)	Mature or Structurally-complex (n=9)	Forest Floor (n=16)	Legacy Structure in "Younger" Stands (n=5)	Legacy Structure in "Older" Stands (n=4)	Totals (n=55)
No Action	11 (65%)	5 (83%)	8 (89%)	15 (94%)	4 (80%)	4 (100%)	45 (82%)
Alt. A	10 (59%)	5 (83%)	9 (100%)	16 (100%)	1 (20%)	4 (100%)	43 (78%)
Alt. B	10 (59%)	5 (83%)	9 (100%)	15 (94%)	4 (80%)	4 (100%)	45 (82%)
Alt. C	10 (59%)	5 (83%)	9 (100%)	15 (94%)	-	4 (100%)	41 (75%)
Alt. D	2 (12%)	5 (83%)	9 (100%)	16 (100%)	4 (80%)	4 (100%)	38 (69%)
No Timber Harvest	-	5 (83%)	9 (100%)	16 (100%)	2 (40%)	4 (100%)	34 (62%)

* Appendix R contains information on species-specific effects.

Young and mature forest habitat would increase in abundance from 53 percent of the 2,161,690 habitat-capable acres to 55-60 percent of the habitat-capable acres in 50 years under all alternatives (**Figure 3-161**). Under the No Timber Harvest Reference Analysis, young and mature forest habitat would increase to 62 percent of habitat-capable in 50 years. The average historic condition was 40 percent of habitat-capable was young and mature forest habitat. The amount of young and mature forest habitat under all alternatives and the No Timber Harvest Reference Analysis would exceed the average historic condition.

Under all alternatives, 83 percent of the species BLM modeled as using young and mature forest habitat would have increased availability of that habitat (**Table 3-249**). The benefit of increased habitat availability may not translate directly to proportional increase in population numbers, since some Bureau Sensitive, Bureau Strategic, and Survey & Manage species have limited ranges or low mobility.

Mature and structurally-complex forest habitat would increase in abundance from 51 percent of the 2,161,690 habitat-capable acres to 68-80 percent of the habitat-capable acres in 50 years under the action alternatives and the No Action alternative (**Figure 3-161**). Under the No Timber Harvest Reference Analysis, mature, and structurally-complex habitat would increase to 84 percent in 50 years. The amount of mature and structurally-complex habitat under the action alternatives would approach the amount available under the average historic condition and the No Timber Harvest Reference Analysis would exceed the average historic condition. Under the action alternatives, 100 percent of the species BLM modeled as using mature and structurally-complex forest habitat would have increased availability of that habitat and under the No Action alternative 89 percent of species would have increased habitat availability (**Table 3-249**). The benefit of increased habitat availability may not translate directly to proportional increase in population numbers, since some Bureau Sensitive, Bureau Strategic, and Survey & Manage species have limited ranges or low-mobility.

Under Alternatives B, C, and the No Action alternative, 94 percent of the species BLM modeled as using forest floor habitats would have increased availability of that habitat. Under Alternatives A and D (as well as the No Timber Harvest Reference Analysis), 100 percent of forest floor species would have increased habitat availability. The benefit of increased habitat availability may not translate directly to proportional increase in population numbers, since some Bureau Sensitive, Bureau Strategic, and Survey & Manage species have limited ranges or low mobility.

Habitat for 80 percent of the species associated with snags and down woody material in younger stands would increase under Alternatives B, D, and the No Action alternative, while 0-20 percent of the species would experience an increase in habitat under Alternative A or C (**Table 3-249**; **Figure 3-163**). Under the No Timber Harvest Reference Analysis, 40 percent of species associated with snags or down woody material in younger stands would have increased habitat availability (**Table 3-249**). For this discussion, species associated with “younger stands” refers to those that use some combination of the early-successional, stand establishment, or young structural stages but do not typically use mature or structurally-complex stages. The lack of green tree retention or snag and down woody material retention would result in Alternative A and C providing the least amount of habitat for species associated with legacy structure in younger stands. The benefit of increased habitat availability may not translate directly to proportional increase in population numbers since some Bureau Sensitive, Bureau Strategic, and Survey & Manage species have limited ranges or low mobility.

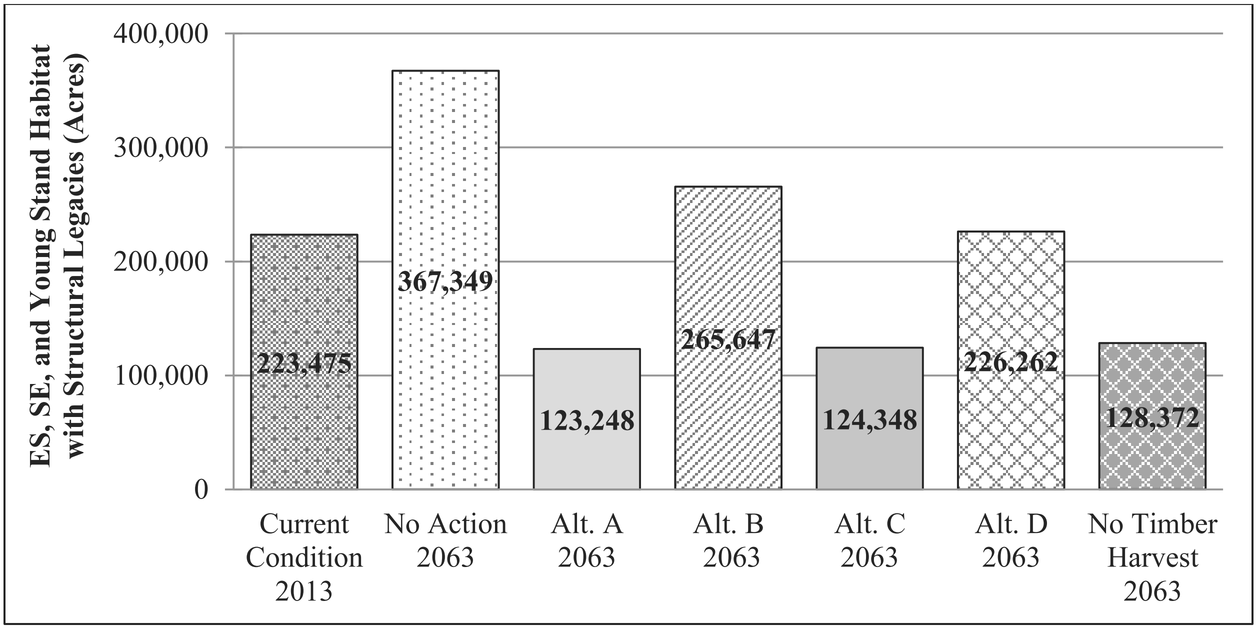

Figure 3-163. Early-successional, stand establishment, and young stands with structural legacies in the decision area.

The alternatives would have similar effects on wildlife species associated with stream habitat, or near-stream riparian habitats, as they would for fish species. All of the alternatives would increase the potential large wood and small functional wood contribution to streams from the current conditions over time. Sediment production from road construction and operation would increase by > 1 percent under all alternatives, and the effects would not differ meaningfully among the alternatives. Under the No Action alternative, and Alternatives A and D, > 0.5 percent of all perennial and fish-bearing reaches in the decision area would currently be susceptible to shade reductions that could affect stream temperature if the BLM applies thinning in the outer zone of the Riparian Reserves. Under Alternative B and C, approximately 5 percent of all perennial and fish-bearing reaches in the decision area would currently be susceptible to shade reductions that could affect stream temperature if the BLM applies thinning in the outer zone of the Riparian Reserves. The Fisheries section contains more detail.

All species associated with legacy structures in older stands would have an increase in habitat under all alternatives, including the No Timber Harvest Reference Analysis (**Table 3-249**, **Figure 3-164**). For this discussion, species associated with "older stands" refers to those that use young, mature, or structurally-complex structural stages but do not typically use the early-successional or stand establishment stages. The benefit of increased habitat availability may not translate directly to a proportional increase in population numbers since some Bureau Sensitive, Bureau Strategic, and Survey & Manage species have limited ranges or low mobility.

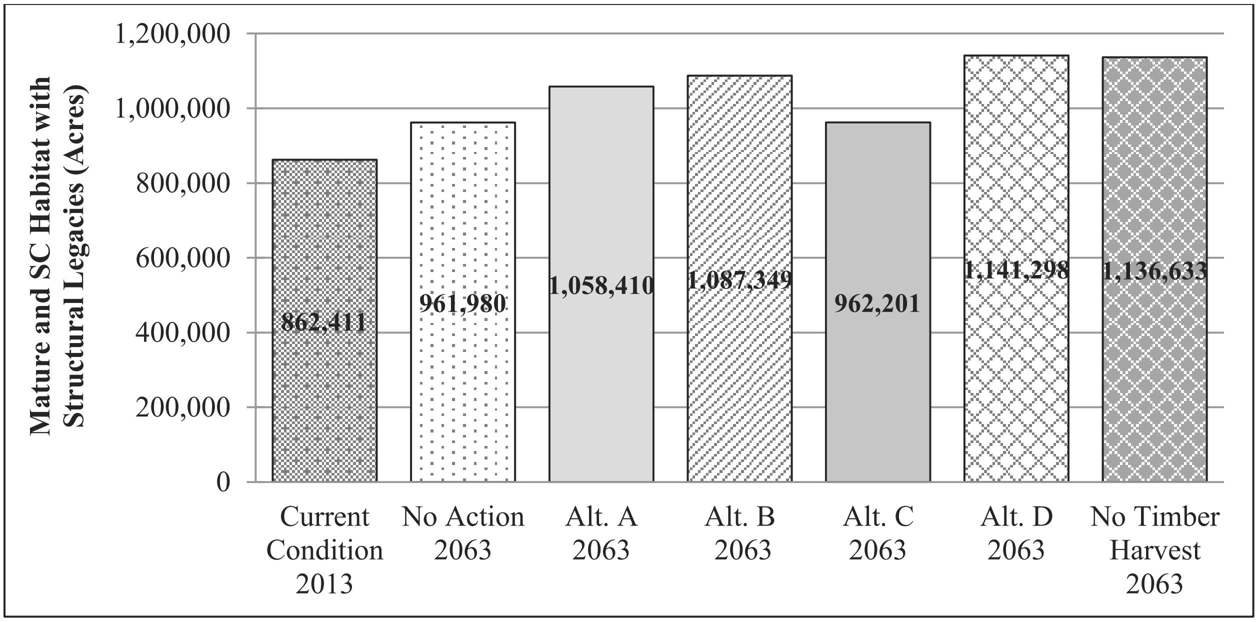

Figure 3-164. Mature and structurally-complex stands with structural legacies within the decision area.

All alternatives would lead to an increase in habitat for a majority of Bureau Sensitive, Bureau Strategic, Survey & Manage wildlife species, and landbird focal species in 50 years (**Table 3-250**). Alternative B and the No Action alternative would provide the most species with increased habitat abundance in 50 years, while the No Timber Harvest Reference Analysis would provide increased habitat abundance for the fewest species.

Table 3-250. Habitat effects summary to Bureau Sensitive, Bureau Strategic, or Survey & Manage wildlife species and to landbird focal species.*

Alternative	Number of Species That Would Have an Increase in Habitat by 2063 (Percent of Species in Group)				
	Bureau Sensitive Species (n=17)	Bureau Strategic Species (n=3)	Survey & Manage Species (n=10)	Landbird Focal Species (n=35)	Totals (n=56)
No Action	17 (100%)	3 (100%)	9 (90%)	27 (77%)	46 (82%)
Alt. A	15 (88%)	3 (100%)	10 (100%)	24 (69%)	44 (78%)
Alt. B	16 (94%)	3 (100%)	9 (90%)	27 (77%)	46 (82%)
Alt. C	14 (82%)	3 (100%)	9 (90%)	23 (66%)	42 (75%)
Alt. D	15 (88%)	3 (100%)	9 (90%)	19 (54%)	38 (68%)
No Timber Harvest	13 (76%)	3 (100%)	9 (90%)	15 (43%)	34 (61%)

* **Appendix R** contains information on species-specific effects.

Under the alternatives, between 64-80 percent of BLM-administered lands would be included in the reserve network, and between 14-30 percent of BLM-administered lands would be included in the Harvest Land Base. Under all alternatives, 6 percent of BLM-administered lands would be included in the Eastside Management Lands. The action alternatives would remove Survey & Manage standards and guidelines that require pre-disturbance surveys and protection of known sites, but even in the absence of such guidelines, habitat and sites of Survey & Manage species that fall within the reserve system would receive protection.

The Bureau Sensitive, Bureau Strategic, and Survey & Manage species generally are associated with mature or structurally-complex forest habitats, which increase in abundance under all alternatives as described in **Table 3-250**. In addition, one of the basic criteria for Survey & Manage species is that they must be closely associated with late-successional or old-growth forest (USDA FS and USDI BLM 2004). Of the 28 Survey & Manage wildlife species considered in this analysis within the planning area, 5 are concurrently listed as Bureau Sensitive while 23 are not concurrently listed as Bureau Sensitive.

The BLM does not always conduct field surveys in order to conserve Bureau Sensitive wildlife species. Instead, the BLM conducts evaluations of the distribution, abundance, population trends, current threats, or habitat for those species using available information in regards to actions the BLM proposed to undertake, consistent with 6840 policy.

Under the No Action alternative, the BLM would continue to implement Survey & Manage Measure to conduct pre-disturbance surveys and protect known sites for the Survey & Manage species. Therefore, continued implementation of the Survey & Manage Measure under the No Action alternative would provide habitat and known sites sufficient to support stable populations on most wildlife species in patterns similar to the their historic reference distributions, with varying levels of certainty (USDA FS and USDI BLM 2000). In addition, as discussed previously, mature and structurally-complex forest habitats for Survey & Manage wildlife species would increase under the No Action alternative in the decision area (**Figure 3-161**) and in the planning area (**Figure 3-162**).

The action alternatives would remove the Survey & Manage Measure that requires pre-disturbance surveys and protection of known sites.

There is incomplete and unavailable information relevant to the effects of the action alternatives on Survey & Manage species. With complete and species-specific survey information on the location of habitat and species sites for all Survey & Manage species, the BLM would be able to analyze the effects of all alternatives on Survey & Manage species and compare the effects under each action alternative to the No Action alternative, which would continue to implement the Survey & Manage Measure. However, the BLM lacks complete and species-specific survey information for most Survey & Manage species (USDA Forest Service and USDI BLM 2004). It would be exorbitantly expensive and time-consuming to conduct random surveys across the decision area for all Survey & Manage species. Consistent with Council on Environmental NEPA regulations at 43 CFR 1502.22, this analysis summarizes the information that is currently available on the effects of the alternatives on Survey & Manage species. The 2004 Final SEIS to Remove or Modify the Survey & Manage Mitigation Measure Standards and Guidelines (USDA FS and USDI BLM 2004) analyzed the removal of Survey & Manage standards and guidelines for known site management and pre-disturbance surveys, and that analysis is incorporated here by reference. However, the U.S. District Court in *Conservation Northwest et al. v. Rey et al.*(Case No. C08-1067- JCC) found that the analysis of effects to species in the 2004 Final SEIS and the 2007 Final SEIS was insufficient to support the conclusion that the Survey & Manage measure was no longer necessary to meet the goals of the Northwest Forest Plan.

Nevertheless, the information in the 2004 SEIS and 2007 SEIS does present analysis based on the incomplete survey information available that concludes that most Survey & Manage species would have sufficient habitat to support stable populations under the No Action alternative without the Survey & Manage measure.

Even in the absence of the Survey & Manage Measure, habitat and sites of species that fall within the reserve system would receive protection. Compared to the No Action alternative, all action alternatives allocate more acres to the Late-Successional Reserve, which the Northwest Forest Plan expected to meet the needs of late-successional and old-growth related species (USDA FS and USDI BLM 2000). To the extent that the No Action alternative without the Survey & Manage Measure would provide sufficient habitat for Survey & Manage species, as analyzed in the 2004 SEIS, the action alternatives would provide additional habitat within the Late-Successional Reserve.

The Survey & Manage species are species associated with "late-successional and old-growth forests" (USDA FS and USDI BLM 2000). To the extent that older and more structurally-complex multi-layered conifer forests as defined in the action alternatives encompass the "late-successional and old-growth forests" that provide habitat for Survey & Manage species, all action alternatives reserve such forests from timber harvest within the Late-Successional Reserve. Under all action alternatives, there would be no timber harvest of older and more structurally-complex multi-layered conifer forests, although each alternative uses a different definition to identify older and more structurally-complex multi-layered conifer forests. Therefore, all of the action alternatives, in contrast to the No Action alternative, would protect from timber harvest the forest conditions with which the Survey & Manage species are associated.

In addition to reserving existing older and more structurally-complex multi-layered conifer forests, the acreage of mature and structurally-complex forest (which is a broader category than older and more structurally-complex multi-layered conifer forests) in the decision area would increase over time under all alternatives. Therefore, the amount of habitat for Survey & Manage wildlife species would increase under all alternatives.

In summary, all action alternatives would remove the Survey & Manage Measure that requires pre-disturbance surveys and protection of known sites. There is incomplete and unavailable information relevant to the effects of the action alternatives on Survey & Manage species. The 2004 FSEIS provides an incomplete analysis, but supports the conclusion that most Survey & Manage species would have sufficient habitat to support stable populations under the No Action alternative without the Survey & Manage measure. All action alternatives allocate more acres to the Late-Successional Reserve than the No Action alternative, protect older and more structurally-complex multi-layered conifer forests, and would result in an increase in mature and structurally-complex forest over time. As a result, and in light of the incomplete information available to the BLM, all action alternatives would protect most existing habitat for Survey & Manage species and would result in an increase in the amount of habitat for Survey & Manage species over time.

The landbird focal species have a broad range of associated habitats, including many species associated with early-successional habitats, which decrease in abundance under the No Timber Harvest Reference Analysis as described above. Thus, landbird focal species and the total species with increased habitat abundance would be lowest under the No Timber Harvest Reference Analysis. The BLM would manage landbird species under the Migratory Bird Treaty Act and following guidance provided by WO IB 2010-110, the Memorandum of Understanding between the BLM and U.S. Fish and Wildlife Service to promote the conservation of migratory birds (August 31, 2010). The BLM would follow migratory bird conservation measures as appropriate and consistent with agency missions. The BLM anticipates that these measures, which are currently under development by the BLM and the U.S. Fish and Wildlife Service, would contain information and recommendations regarding how to avoid disturbing raptors and other migratory birds and how to avoid negatively affecting their populations. At the project level, the BLM would implement measures to lessen take of migratory birds under the Migratory Bird Treaty Act focusing on species of concern as identified by the BLM and U.S. Fish and Wildlife Service.

Appendix R contains additional information and supporting data on Bureau Sensitive, Bureau Strategic, Survey & Manage wildlife species, and landbird focal species.

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Columbian White-tailed Deer

Key Points

- Alternatives A, B, C, and the No Action alternative would increase the amount of high-quality forage habitat for Columbian white-tailed deer on BLM-administered lands in 50 years.

Background

The U.S. Fish and Wildlife Service listed the Columbian white-tailed deer (*Odocoileus virginianus leucurus*) as an endangered species under the Endangered Species Act on March 10, 1967 (32 FR 4001). There are two distinct population segments of Columbian white-tailed deer in the planning area: the Lower Columbia River population, which occurs in Clatsop and Columbia counties, and the Douglas County population, which occurs in Douglas County (USFWS 2013a). Historically, the Columbian white-tailed deer's range included 23,170 square miles from Grants Pass, Oregon north to the Cowlitz River in Washington (USFWS 2013b). Currently, the range of the Lower Columbia River DPS is reduced to approximately 93 square miles and includes portions of Clatsop and Columbia counties in Oregon but given their mobility, deer can periodically occur outside of these areas. In addition, Oregon Biodiversity Information Center data indicate that since 1990 Columbian white-tailed deer have been observed in Clatsop, Columbia, Multnomah, and Douglas counties (ORBIC 2014). The U.S. Fish and Wildlife Service delisted the Douglas County distinct population segment on July 24, 2003 (68 FR 43647); the Lower Columbia River distinct population segment remains listed as endangered. Critical habitat for the Columbian white-tailed deer has not been designated by the U.S. Fish and Wildlife Service.

At the time of listing, the U.S. Fish and Wildlife Service estimated the total number of deer remaining to be less than 1,000, but the Douglas County population segment has now increased to over 5,000 animals (USFWS 2013a). In 1996, the Lower Columbia River distinct population segment suffered heavy losses due to extensive flooding of its habitat. However, the U.S. Fish and Wildlife Service expects this population segment to recover to pre-flood numbers within a few years. The total deer population in the Lower Columbia River DPS has been at least 400 animals since 1984 and in 2011 the total population was 603 deer (USFWS 2013b).

Habitat for Columbian white-tailed deer in the Lower Columbia River DPS includes pastures of reed canary grass, tall fescue, and mixed deciduous and Sitka spruce forest (USFWS 2013b). Habitat for Columbian white-tailed deer in the Douglas County DPS includes predominantly oak-madrone woodland and riparian cover types. Columbian white-tailed deer concentrate their habitat use near streams or rivers (within 650 feet). Distance to stream is more important than the vegetative condition in determining habitat for Columbian white-tailed deer. However, Columbian white-tailed deer evolved in association with prairie edge and woodland habitats and were not historically confined limited to riparian and lowland habitats as the species now exhibits. Urban development and agricultural areas now limit the Columbian white-tailed deer to lower lying and wetter habitat than the species would have been historically associated. The Oregon Department of Fish and Wildlife associate differences in the quality of habitat with forage quality and forest structural stage for related deer species (e.g., black-tailed deer). Early-successional forests provide more diverse, abundant, and nutritious forage through the forbs and shrubs that grow for 10 to 15 years following a clear-cut or stand-replacing natural disturbance (ODFW 2014, ODFW 2008). These high-quality forage conditions persist until the canopy from regenerating conifer seedlings restricts sunlight to the low-lying forbs and shrubs (ODFW 2014).

Issue 1

What levels of habitat for the Columbian white-tailed deer would be available under each alternative?

Summary of Analytical Methods

In this analysis, the BLM assumed that all forested BLM-administered lands within Clatsop, Columbia, Multnomah, and Douglas Counties are habitat for Columbian white-tailed deer. Preliminary analysis of BLM-administered lands within 650 feet of streams in the four counties encompassed 92 percent of all BLM-administered lands. Based on this preliminary result, and to simplify analytical procedures, the BLM assumed that all BLM-administered lands within the four counties could provide habitat for Columbian white-tailed deer. This assumption overestimates the amount of habitat for the Columbian white-tailed deer since the habitat modeling was not limited to mixed deciduous-Sitka spruce forest or oak-madrone forest. However, given that Columbian white-tailed deer are currently limited to wetter, more lowland habitats than existed historically, and they may occur outside their limited range due to their mobility, the overestimation of habitat is within the capability of the species.

In this analysis, the BLM assumed that the early-successional stage forest represents high-quality forage habitat for deer. Given the similarity in habitat needs and the life history of black-tailed deer and Columbian white-tailed deer, the BLM assumed that early-successional forests would similarly provide high-quality forage habitat for Columbian white-tailed deer. Rowland *et al.* (2013) developed a model to evaluate elk nutrition and habitat use in landscape settings. The BLM ran the nutrition model on two watersheds (Upper Alsea River and Rock Creek watersheds) to test if using the early-successional structural stages as a surrogate for high-quality forage habitat is a reasonable assumption. In the Upper Alsea River watershed, the mean dietary digestible energy class was slightly higher in the early-successional stages (low-marginal forage quality) than in the other structural stages (poor forage quality) although the median class was indistinguishable from the others (low-marginal forage quality). In the Rock Creek watershed, the mean and median dietary digestible energy classes were slightly higher in the early-successional stages (low-marginal forage quality) than in the other structural stages (poor forage quality). Based on this results from the sample watersheds, the absolute difference in forage quality between early-successional and the other structural stages is not dramatically different, but the early-successional stage does appear to provide slightly better forage quality relative to the other stages. Therefore, the BLM continues to regard early-successional structural stages as a reasonable measure of "high-quality forage habitat" for deer and elk species. Habitat use in the Rowland *et al.* (2013) model was not used by the BLM in this analysis, because that model requires information on locations of open and closed roads across ownerships, which the BLM cannot reasonably predict across ownerships through time.

This issue presents both an analysis of the direct and indirect effects of alternative implementation on Columbia white-tailed deer habitat in the decision area and an analysis of the cumulative effects on Columbia white-tailed deer habitat of past, present, and reasonably foreseeable future actions, including land management activities on BLM-administered lands and non-BLM-administered lands in the planning area. The BLM modeled habitat on non-BLM-administered lands within the planning area using the 2012 GNN structural condition.

The BLM did not model changes in the white-tailed deer population since there are other factors that influencing populations outside the scope of BLM land management decisions, such as harvest levels of deer authorized by Oregon Department of Fish and Wildlife and mortality from predators or vehicle collisions.

Affected Environment and Environmental Consequences

There are 295 acres of high-quality forage habitat (**Figure 3-165**) for the Lower Columbia River population of Columbian white-tailed deer in the decision area, which is 2 percent of the 14,186 habitat-capable acres. There are 87,711 acres of high-quality forage habitat (**Figure 3-166**) for the Lower Columbia River population in the planning area, which is 9 percent of the 938,276 habitat-capable acres. The current BLM contribution to high-quality forage habitat for the Lower Columbia River population is less than1 percent of the available higher quality forage habitat available in the planning area.

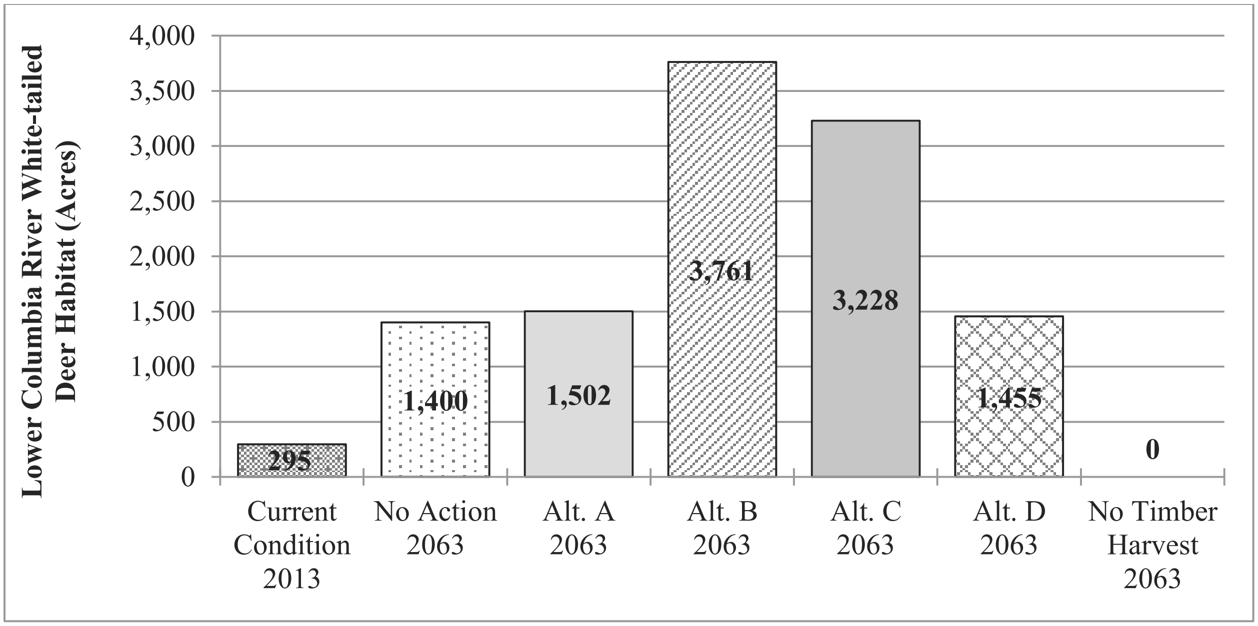

Figure 3-165. Columbian white-tailed deer high-quality forage habitat for the Lower Columbia River population in the decision area.

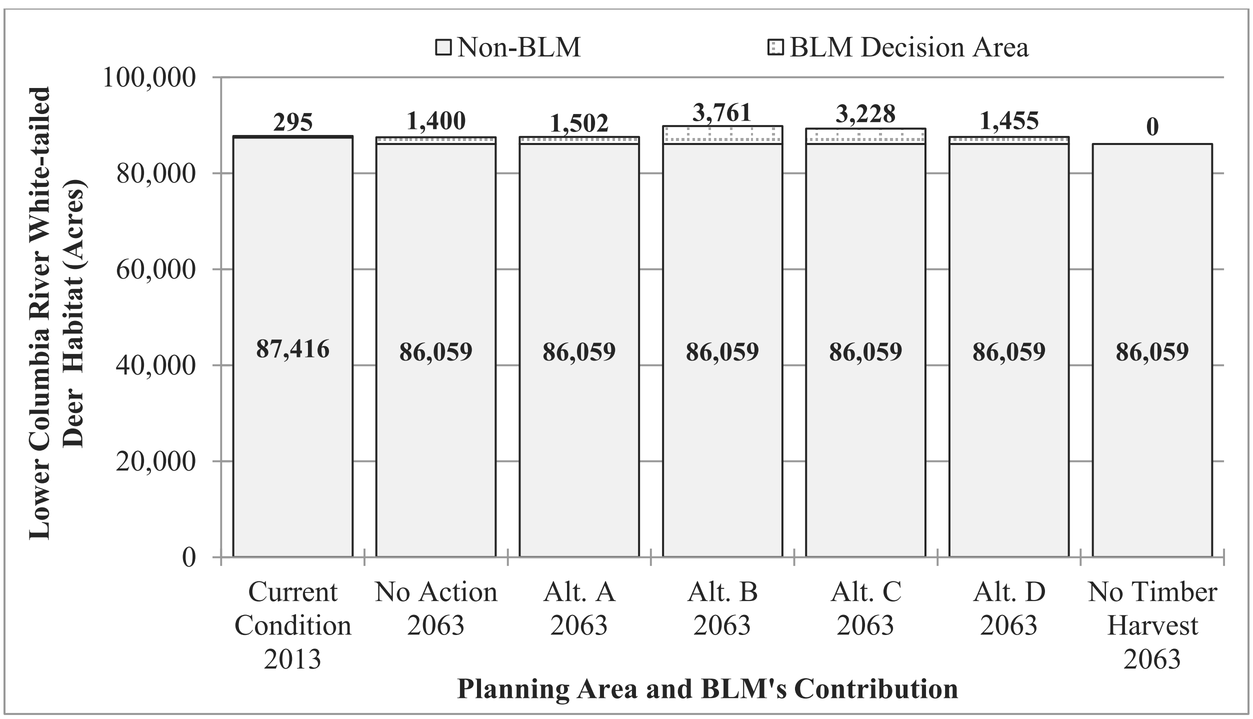

Figure 3-166. Columbian white-tailed deer high-quality forage habitat for the Lower Columbia River population in the planning area.

Under all alternatives, higher quality forage habitat would increase substantially for the Lower Columbia River population on BLM-administered lands in 50 years (**Figure 3-165**). Alternatives B and C would provide 10 to 12 times as much high quality forage habitat in 50 years than there is currently. Alternatives A and D, and the No Action alternative would provide five times the amount of higher quality forage habitat than there is currently. In contrast, the No Timber Harvest Reference Analysis would decrease the amount of habitat provided, dropping to zero in 50 years.

Across all ownership for the Lower Columbia River population, the amount of high-quality forage habitat would not change substantively. Alternatives B and C would have a slight increase (2 percent) and Alternatives A and D, and the No Action would remain essentially unchanged (**Figure 3-166**). Under the No Timber Harvest Reference Analysis, there would be a two percent reduction in the amount of high quality forage habitat in the Lower Columbia River population. In 50 years, the BLM-administered lands would contribute two percent of the available higher quality forage habitat for the Lower Columbia River population in the planning area under Alternatives A and D and the No Action alternative, while Alternatives B and C would contribute 4 percent of the available higher quality forage habitat.

There are 9,834 acres of high-quality forage habitat (**Figure 3-167)** for the Douglas County population of Columbian white-tailed deer in the decision area, which is 2 percent of the 613,019 habitat-capable acres. There are 133,197 acres of high-quality forage habitat (**Figure 3-168**) for the Lower Columbia River population in the planning area, which is 5 percent of the 2,885,549 habitat-capable acres. The current BLM contribution to high-quality forage habitat for the Douglas County population is 7 percent of the available high-quality forage habitat available in the planning area.

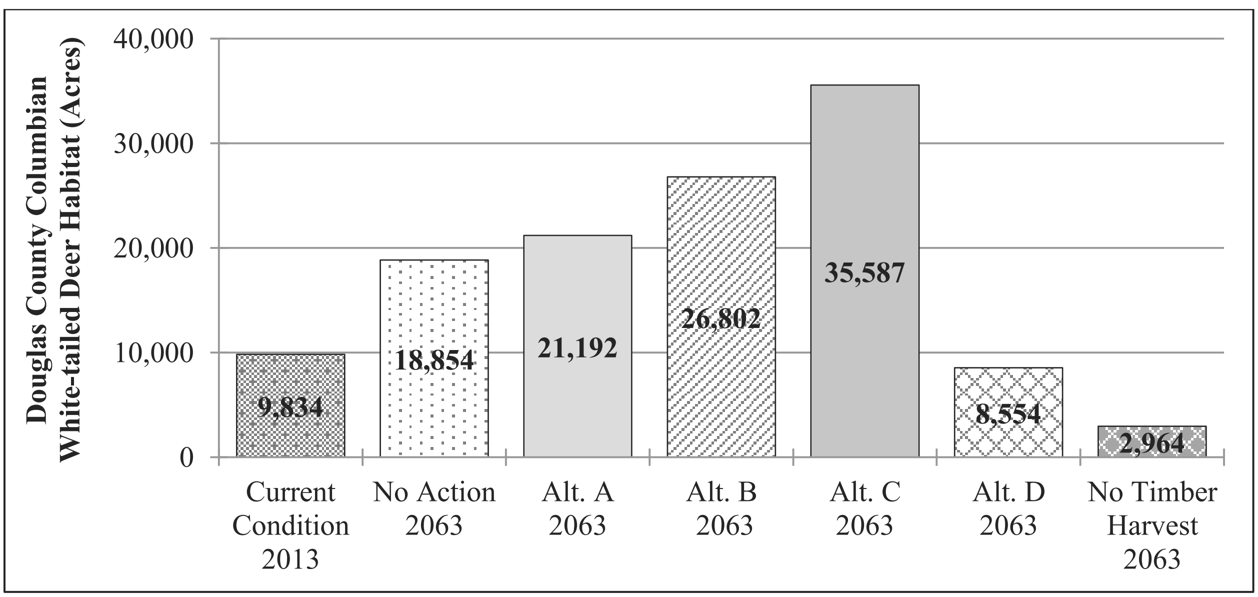

Figure 3-167. Columbian white-tailed deer high-quality forage habitat for the Douglas County population in the decision area.

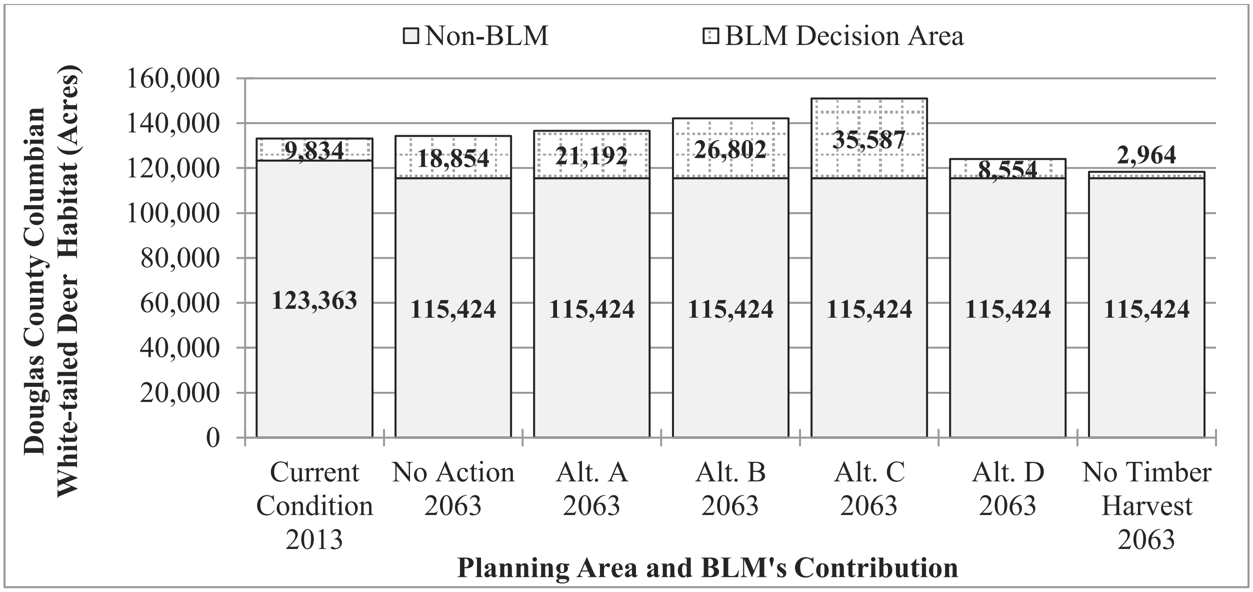

Figure 3-168. Columbian white-tailed deer high-quality forage habitat for the Douglas County population in the planning area.

Under Alternatives A, B, and C, and the No Action alternative, high-quality forage habitat would increase substantially for the Douglas County population on BLM-administered lands in 50 years (**Figure 3-167**). Alternatives C would result in four times as much high quality forage habitat in 50 years than there is currently. Alternatives A and B, and the No Action alternative would provide two to three times the amount of higher quality forage habitat than there is currently. In contrast, Alternative D and the No Timber Harvest Reference Analysis would decrease the amount of habitat provided in 50 years.

Across all ownership for the Douglas County population, higher quality forage habitat would increase under Alternatives A, B, and C, and the No Action alternative (**Figure 3-168**). Alternatives B and C would provide the greatest increase in higher quality forage habitat in 50 years (7 and 13 percent more, respectively). The No Action alternative and Alternative A would provide a slight increase (1-3 percent). Under the Alternative D and the No Timber Harvest Reference Analysis, there would be a 7 and 11 percent reduction in the amount of high quality forage habitat provided for the Douglas County population in 50 years. The reduction in higher quality forage habitat across all ownerships would be a result of the loss of early-successional habitat from lands in the reserves on BLM-administered lands and USFS lands, as these stands develop and mature. In 50 years, the BLM-administered lands would contribute 24 percent of the available higher quality forage habitat for the Douglas County population in the planning area under Alternative C and the No Action alternative, and Alternatives A and B would contribute 14, 16, and 19 percent of the available higher quality forage habitat, respectively. In 50 years, the BLM-administered lands would contribute 7percent of the available high-quality forage habitat for the Douglas County population in the planning area under Alternative D and the No Timber Harvest Reference Analysis would result in a contribution of three percent.

Within the Lower Columbia River DPS, flooding is a threat to Columbian white-tailed deer habitat when inundated for prolonged periods of time (USFWS 2013b). The risk of prolonged flooding could increase with the effects of climate change but the U.S. Fish and Wildlife Service does not expect that increased flooding would put the Lower Columbia River DPS at risk of extinction. Increased flooding could force deer to move into more developed habitat.

Overall, Alternatives A, B, and C, and the No Action alternative would increase the amount of higher quality forage habitat for Columbian white-tailed deer on BLM-administered lands in 50 years. Alternative D would also increase the amount of higher quality forage habitat available in 50 years on BLM-administered lands for the Lower Columbia River Population, but decrease it for the Douglas County population. Increased availability of higher quality forage through early-successional structural stages would benefit Columbian white-tailed deer, since early seral habitats are required for maintaining productive ungulate populations (Cook *et al.* 2013). Greater availability of higher quality forage would improve ungulate survival and reproduction (e.g., pregnancy rates, fetal survival, neonatal survival, juvenile growth rates, vulnerability to overwinter starvation, and age at first breeding) (Cook *et al.* 2013, p. 37).

Appendix R contains additional information and supporting data on Columbian white-tailed deer.

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Fisher

Key Points

- The No Action alternative would lead to a continual loss of fisher habitat over 50 years.
- All action alternatives would have a slight loss of fisher habitat in the first two decades, but additional habitat would develop in subsequent decades that would eventually surpass current conditions.

Background

Historically, fishers (*Pekania pennanti*) occurred in Oregon throughout the Coastal and Cascade mountains (USDI FWS 2013). Currently, remaining populations of fishers are restricted to two separate and genetically isolated populations in southwestern Oregon; one in the northern Siskiyou Mountains and one in the southern Cascade Range (USDI FWS 2014). The U.S. Fish and Wildlife Service proposed to list the West Coast Distinct Population Segment of fisher, referred to as “fisher” henceforth, as a threatened species under the Endangered Species Act on October 7, 2014 (79 FR 60419).

Reliable fisher observations occur in 10 sub-basins in the planning area including: Applegate, Chetco, Illinois, Middle Rogue, Upper Klamath, Upper Klamath Lake, Upper Rogue, North Umpqua, South Umpqua, and Williamson (GeoBOB 2013, ORBIC 2014).

Fisher habitat is comprised of denning habitat, resting habitat, and foraging habitat. Denning habitat is habitat that fishers use for reproduction, denning, and rearing of young. Cavities in live or dead trees are a key characteristic of denning habitat (Lofroth *et al.* 2010). Resting habitat is habitat that fishers use for thermal regulation and security, in proximity to prey. High canopy cover, an abundance of large trees, and incidence of mistletoe or rust brooms are characteristic of resting habitat. Fishers use foraging habitat to locate and capture prey.

The main threats to fisher are habitat loss and fragmentation due to wildfire and vegetation management, toxicants (i.e., anti-coagulant rodenticides), and the synergistic effects of these and other factors (e.g. fisher mortality from vehicle collisions) on small populations (Aubry and Lewis 2003, 79 FR 60420). Analysis of the Management Situation for the RMPs for Western Oregon provides more information on the historic range, habitat, and known populations, which is incorporated here by reference (USDI BLM 2013, p. 145).

Fisher are detected more often in areas with fewer disjunct core areas and more contiguous patches of habitat (Lofroth *et al.* 2011). Fisher are detected more in habitat that has a greater amount of Douglas-fir, a greater amount of 51 to 75 percent canopy cover, less barren area, a greater density of low use roads (closed to public or seasonal use only), and fewer disjunct core areas. “Core area” is defined as an area of habitat more than 328 feet from the edge of habitat.

The mean male home range size is 20.8 square miles (13,329 acres) and the mean female home range is 7.3 square miles (4,692 acres). Dispersing juvenile fisher are capable of moving long distances (up to 84 miles) and navigating across or around various landscape features including rivers, highways, and rural communities. In the Cascade Range in southern Oregon, juvenile males dispersed an average of 18.0 miles and juvenile females dispersed an average of 3.7 miles.

Issue 1

What levels of habitat for the fisher would be available under each alternative?

Summary of Analytical Methods

In this analysis, the BLM assumed that total habitat for the fisher is comprised of young, mature, or structurally-complex forest stands within the 11 sub-basins that represent the current range of the species (**Figure 3-169**).

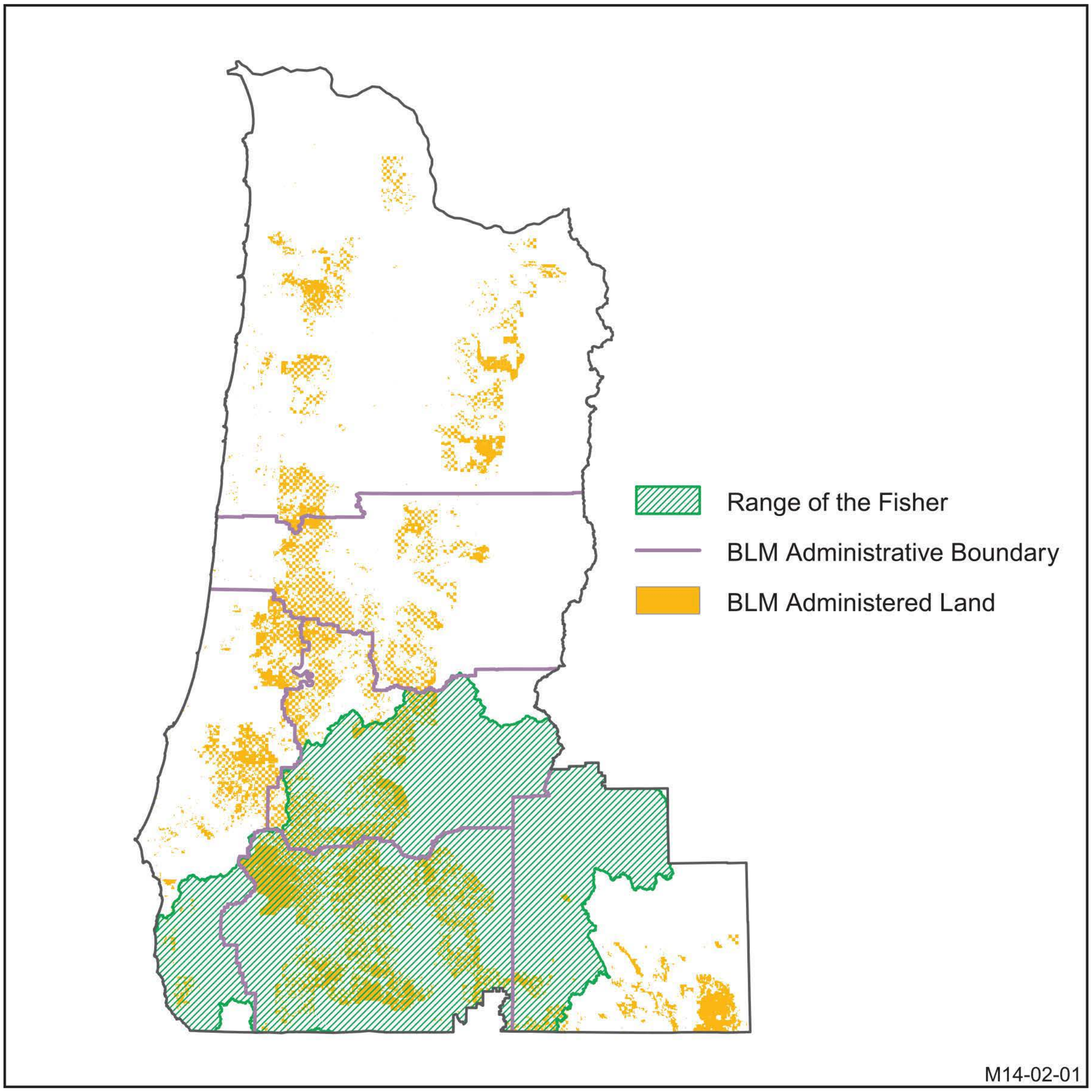

Figure 3-169. Range of the fisher.

The current range of the fisher used in this analysis is based on sub-basins where there are documented observations that the BLM considers to have "excellent" reliability. For this analysis, the 11 sub-basins currently representing the current range of fisher include the 10 listed the background discussion (above) and the Lower Rogue. The Planning Criteria described seven sub-basins representing the range of the fisher using the GeoBOB data (pp. 190-192), but subsequent inclusion of additional excellent observations from ORBIC data yields an additional three sub-basins in the planning area: North Umpqua, South Umpqua, and Williamson sub-basins.

The Lower Rogue sub-basin does not have observations that the BLM considers to have “excellent” reliability but is included because of the arrangement of the other sub-basins and the fisher’s ability to disperse. The Lower Rogue sub-basin is approximately 11 to 20 miles across, north to south, with reliable sightings in sub-basins to the north, east, and south. For the purpose of this analysis, the BLM assumed that fisher utilize the Lower Rogue sub-basin as part of their range, because fisher can disperse an average of 3.7 to 18.0 miles.

In this analysis, the BLM divided habitat for the fisher into three categories: denning, resting, and foraging. The following structural stages represent the three categories of fisher habitat:

- Denning Habitat – structurally-complex
- Resting Habitat – structurally-complex and mature, multi-layered canopy
- Foraging Habitat – structurally-complex, mature multi-layered canopy, and young with structural legacy

The BLM assumed that denning habitat would also provide resting and foraging functions, resting habitat would also provide foraging function, and foraging habitat would only provide foraging function.

This issue presents both an analysis of the direct and indirect effects of alternative implementation on fisher habitat in the decision area and an analysis of the cumulative effects on fisher habitat of past, present, and reasonably foreseeable future actions, including land management activities on BLM-administered lands and non-BLM-administered lands in the planning area. The BLM modeled habitat on non-BLM-administered lands within the planning area using the 2012 GNN structural condition.

The BLM assessed habitat connectivity by calculating the amount of “edge habitat” and “core habitat” on BLM-administered lands. Based on Lofroth *et al.* (2011), the BLM defined core habitat as the interior portion of a contiguous block of denning habitat that is more than 328 feet from non-habitat. BLM also defined edge as denning habitat that is no more than 328 feet from non-habitat. There are no quantified thresholds for the amount of core habitat needed by fishers or the effects of changes in patch size. In this analysis, the BLM considered habitat quality and connectivity to increase as the proportion of available habitat in core habitat increases and as patch size increases.

The BLM did not forecast population trends of the fisher, because a quantified relationship between the specific number of individuals and the availability of habitat is unknown. Even though there are estimates of fisher home range size, other factors that influence fisher populations are not predictable and are unaffected by BLM land management actions (e.g., mortality from toxicants or vehicle collisions).

Affected Environment and Environmental Effects

There are currently 324,478 acres of denning habitat, 153,657 acres of resting habitat, and 96,084 acres of foraging habitat for fisher in the decision area (**Table 3-251**). Approximately 54 percent of the BLM-administered land capable of providing fisher habitat is currently providing habitat function; 31 percent as denning habitat, 15 percent as resting habitat, and 9 percent as foraging habitat.

Table 3-251. Current fisher habitat in the decision and planning areas.

Fisher Habitat Type	Decision Area		Planning Area	
	(Acres)	(% of Habitat Capable)	(Acres)	(% of Habitat Capable)
Denning	324,478	31%	639,797	10%
Resting	153,657	15%	826,012	13%
Foraging	96,084	9%	3,019,215	49%
Total Fisher Habitat	**574,219**	**54%**	**4,485,024**	**72%**
Total Habitat-Capable	**1,057,676**	**100%**	**6,224,237**	**100%**

In the planning area, there is currently 639,797 acres of denning habitat, 826,012 acres of resting habitat, and 3,019,215 acres of foraging habitat for the fisher. Approximately 72 percent of land capable of providing fisher habitat is providing some form of habitat function. The BLM-administered lands contribute 51 percent of the available denning habitat and 13 percent of total fisher habitat in the planning area.

Under the No Timber Harvest Reference Analysis, there would be 644,357 acres of total fisher habitat, 398,633 acres of denning habitat, and 160,996 acres of resting habitat on BLM-administered lands in 50 years (**Figure 3-170**).[93] Under all action alternatives, the amount of total habitat, denning habitat, and resting habitat would increase from current levels in 50 years. In 50 years, the action alternatives would provide 8 to 15 percent more total fisher habitat, 13 to 20 percent more denning habitat, and 5 to 26 percent more resting habitat than current amounts. Alternative B would result in the greatest increase in total fisher habitat and resting habitat (662,866 and 193,001 acres respectively), Alternative D would result in the greatest increase in denning habitat (389,533 acres) and Alternative C the least increase of either (620,639 and 365,611 acres, respectively) among the action alternatives. In contrast to all action alternatives, the No Action alternative would decrease the amount of total habitat, denning habitat, and resting habitat from current levels in 50 years.

[93] Foraging habitat would decrease under all alternatives, including the No Timber Harvest Reference Analysis (**Figure 3-170**). The reduction of foraging habitat would not represent a loss of overall habitat, but rather a consequence of foraging-only habitat developing into denning habitat or resting habitat, which provide foraging functions as well.

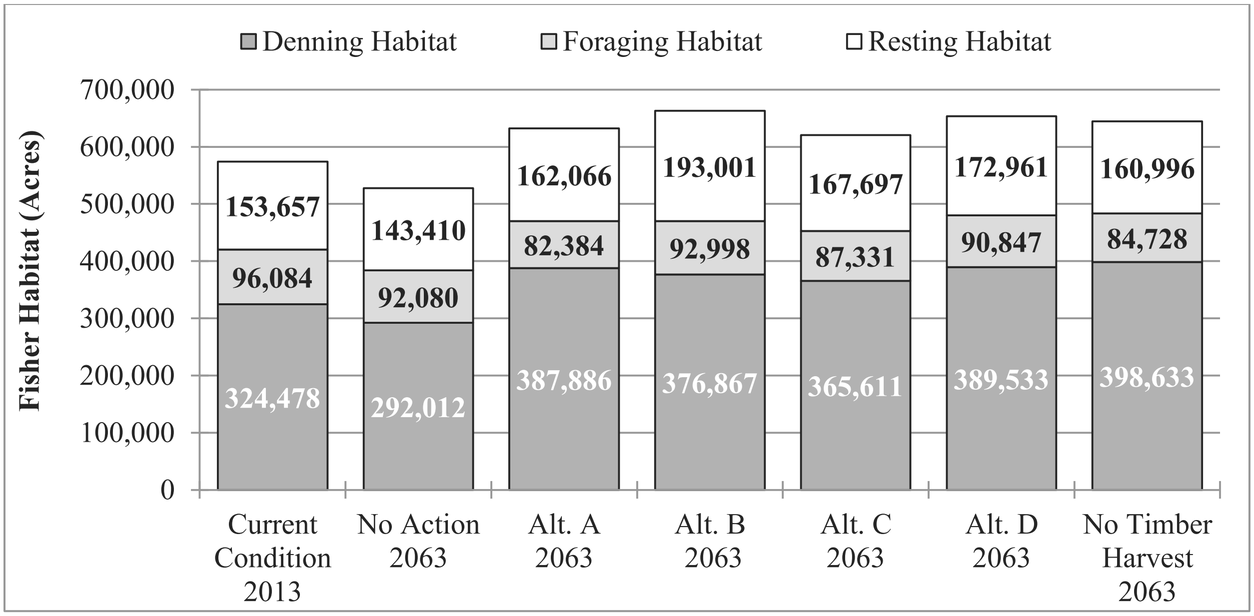

Figure 3-170. Fisher habitat in the decision area.

The action alternatives would have a 1 to 3 percent loss of denning habitat in the first decade (and in the second decade for Alternative C), but additional habitat would develop in subsequent decades that would surpass current conditions by 2033 (*Appendix R*). Similarly, total fisher habitat and resting habitat would decrease in the first two decades under the action alternatives (by 3-5 percent and 10-15 percent, respectively), but additional habitat would develop in subsequent decades that would surpass current conditions by the year 2043. In contrast, the No Action alternative would lead to a continual decrease in total fisher habitat, denning habitat, and resting habitat over 50 years (**Figure 3-170**).

Currently, the average patch size of fisher habitat is 33.0 acres (**Table 3-252**). Under the No Timber Harvest Reference Analysis, average patch size would increase to 35.9 acres in 50 years. Under all action alternatives, average patch size would decrease slightly from current conditions (30.1 to 32.6 acres) in 50 years. Under the No Action alternative, average patch size would decrease more substantially from current conditions (20.4 acres). Using patch size as an index of habitat fragmentation, there would be some fragmentation of fisher habitat under the action alternatives, but this increase in fragmentation would be slight and similar amongst the action alternatives. The No Action alternative would result in a more substantial fragmentation of fisher habitat based on patch size.

Table 3-252. Fisher habitat patch metrics.

Alternative	Mean Patch Size (Acres)	Edge vs. Core Habitat		
		Edge Habitat (Acres)	Core Habitat (Acres)	Percent Core (%)
Current Condition (2013)	33.0	393,710	180,511	31%
No Action (2063)	20.4	381,360	146,143	28%
Alt. A (2063)	31.4	428,759	203,578	32%
Alt. B (2063)	32.3	450,183	212,684	32%
Alt. C (2063)	30.1	420,919	199,721	32%
Alt. D (2063)	32.6	441,553	211,790	32%
No Timber Harvest (2063)	35.9	433,931	210,428	33%

Currently, 31 percent of total fisher habitat is core habitat (**Table 3-252**). Under the No Timber Harvest Reference Analysis, core habitat would increase to 33 percent of total fisher habitat in 50 years. Under all action alternatives, core habitat would increase to 32 percent of total fisher habitat in 50 years. In contrast, the No Action alternative would reduce the amount of core habitat to 28 percent of total fisher habitat in 50 years. These results are similar to changes in average patch size. It is unknown whether a slight reduction in the proportion of core habitat (1 percent) would lead to a perceptible decrease in use by fisher. By comparison, the No Timber Harvest Reference Analysis would provide 33 percent of the total fisher habitat as core habitat.

Because fishers use large contiguous tracts of habitat (Lofroth *et al.* 2011), increased fragmentation of habitat would reduce the suitability of forest stands as habitat. However, fishers typically use numerous patches of habitat over a large landscape, and it is unknown if the slight reductions in patch size modeled under the action alternatives would result in any meaningful decrease in habitat use by the fisher. Similarly, it is unknown whether the slight increases of core habitat under the action alternatives would result in any meaningful increase in habitat use by the fisher. However, the effects from fragmentation under the No Action alternative would be more pronounced and more likely to result in a meaningful decrease in habitat use by fisher than the action alternatives, because of the more substantial decrease in average patch size and decrease of core habitat.

At the planning area scale, total fisher habitat would increase slightly from current amounts under the all alternatives, including the No Action alternative, in 50 years (**Figure 3-171**). Under the No Action alternative, total fisher habitat would increase at the planning area scale even though it would decrease on BLM-administered lands, because of the increase in fisher habitat on U.S. Forest Service reserve lands. At the planning area scale, there is little differentiation in fisher habitat development among the action alternatives. Under the action alternatives, BLM-administered lands would contribute 13 to 14 percent of the total fisher habitat and 38 to 39 percent of the denning habitat in the planning area in 50 years. Under the No Action alternative, BLM-administered lands would contribute 12 percent of the total fisher habitat and 33 percent of denning habitat in the planning area in 50 years.

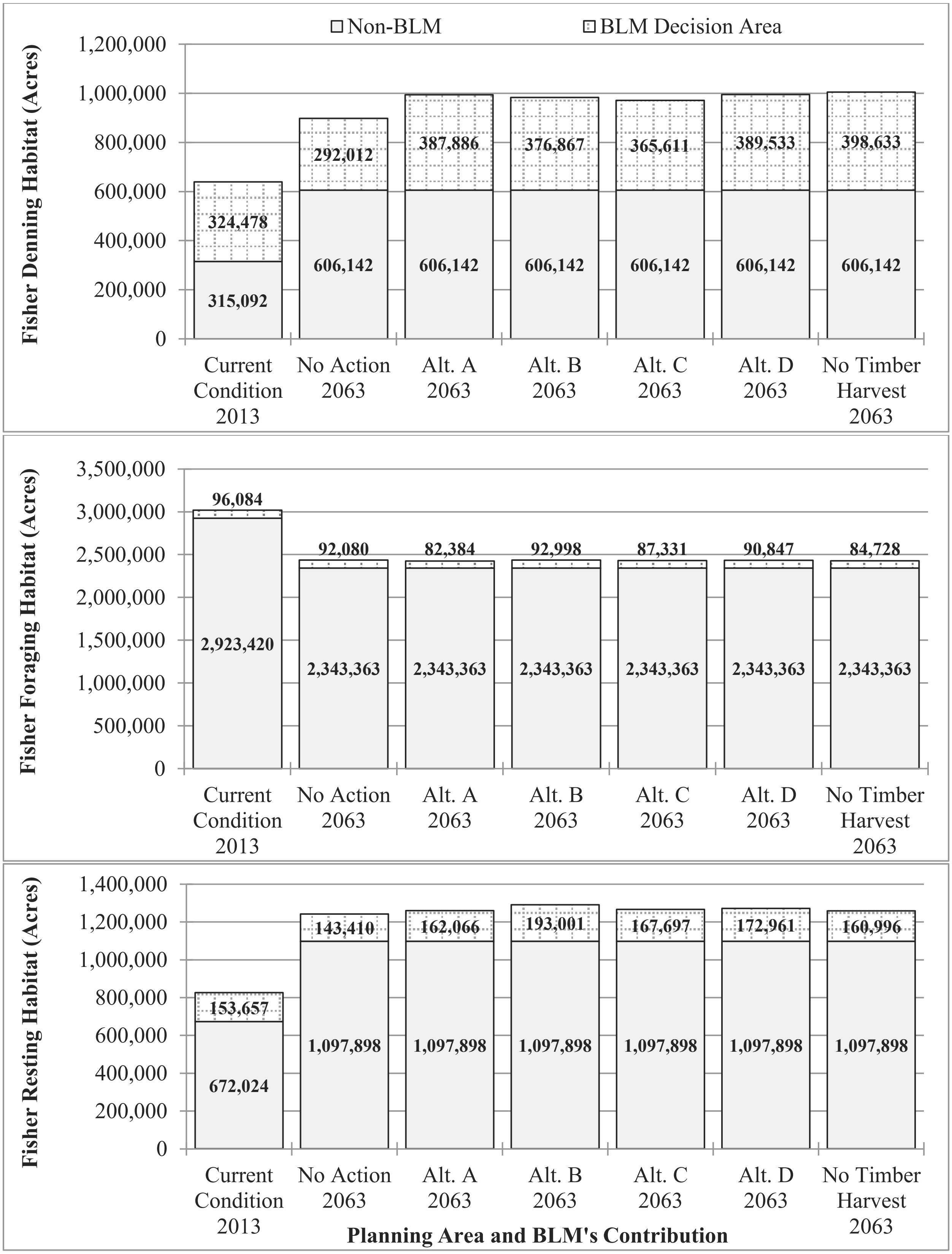

Figure 3-171. Fisher habitat in the planning area and BLMs contribution for denning (top), foraging (middle), and resting (bottom).

Figure 3-172 shows the amount of each type of fisher habitat within the planning area in 50 years.

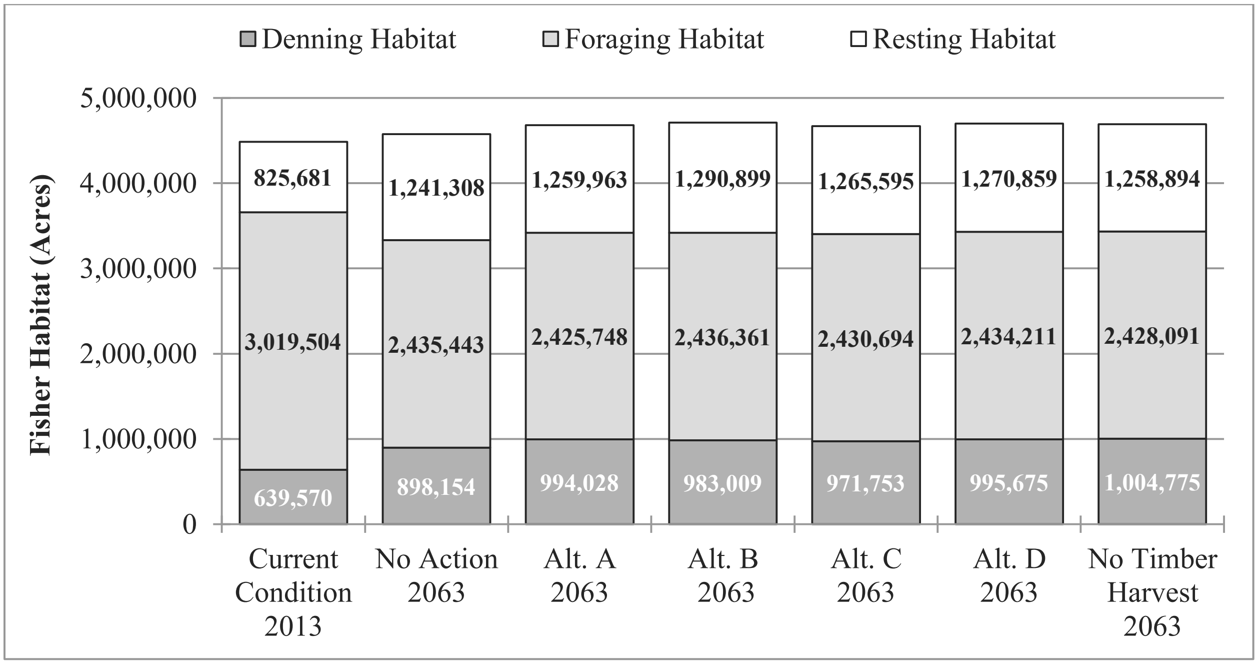

Figure 3-172. Fisher habitat in the planning area.

Appendix R contains additional information and supporting data on fisher.

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Golden Eagle

Key Points

- All alternatives would lead to an increase in golden eagle nesting habitat in 50 years.
- All alternatives would have a slight loss of golden eagle habitat in the first two or three decades, but additional habitat would develop in subsequent decades that would eventually surpass current conditions.

Background

Golden eagles (*Aquila chrysaetos canadensiss*) nest in open and semi-open habitat; they may also nest in coniferous habitat when open space is available (e.g., fire breaks, clear-cuts, burned areas, pasture-land) (Pagel *et al.*, 2010) or there are "broad expanses of open country" available for foraging (Johnsgard, 1990). Golden eagles nest on cliffs, the largest trees in forested stands, or artificial structures. In Oregon, golden eagles built 82 percent of their nests on cliffs, 16 percent in trees, and 1 percent on electrical poles/pylons (Isaacs 2014).

Previously, Isaacs (2011) reported that golden eagle populations in the western U.S. are suspected of a long-term decline. A consistent and statewide survey effort for golden eagles was conducted in 2011 and the results suggest that there is a long-term loss of potential breeding areas of 14.2 percent in Oregon. However, three years of monitoring data (2011-2013) suggest that the nesting population of golden eagles in Oregon may be stable (Isaacs 2014). The minimum state-wide estimate for golden eagles was 459 nesting pairs in 2011, 571 nesting pairs in 2012, and 573 nesting pairs in 2013. Estimates of the nesting population from the 1980's were 500 pairs which is comparable to the current estimates suggesting no substantive changes in population size. The Northwestern and southwestern portions of Oregon have not been fully searched for golden eagle nests and therefore population size of nesting golden eagles in the State may be underestimated. Potential threats to golden eagles in Oregon include reduced prey abundance (e.g., jackrabbits), increased off-road recreation, increased rodent shooting, and loss of potential nest trees (Isaacs 2011).

Within the planning area, there are 95 golden eagle breeding areas (**Table 3-253**), concentrated mainly in the Klamath Falls Field Office, Roseburg District, and the Medford District (i.e., Klamath, Douglas, and Jackson counties). Based on Isaacs 2011 data, 45 percent of the 38 breeding areas surveyed in the planning area were occupied by golden eagles. Golden eagles nested historically within nine counties in the planning area (i.e., Klamath, Douglas, Jackson, Curry, Clackamas, Coos, Josephine, Lane, and Linn Counties).

Table 3-253. Golden eagle breeding areas within the planning area.

County*	Historical (Pre-2011) (#)	Surveyed in 2011 (#)	Occupied in 2011 (#)
Clackamas	2	-	-
Coos	2	1	-
Curry	5	-	-
Douglas	19	4	3
Jackson	17	10	4
Josephine	2	-	-
Klamath	44	22	9
Lane	2	-	-
Linn	2	1	1
Totals	**95**	**38**	**17**

* The remaining counties in the planning area (Clatsop, Columbia, Tillamook, Washington, Multnomah, Yamhill, Marion, Lincoln, Polk, and Benton) do not have historical golden eagle breeding areas.

Over 98 percent of golden eagle observations are within 4 miles of the center of their territory center (McGrady *et al.* 2002). The U.S. Fish and Wildlife Service (Pagel *et al.* 2010) and Isaacs (2014) recommend that the inventory of nesting habitat should be conducted within 10 miles of project boundaries when ascertaining habitat use by golden eagles.

Golden eagles are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Under the Bald and Golden Eagle Protection Act, the BLM has issued policy guidance directing analysis of impacts on golden eagles. The Analysis of the Management Situation for the RMPs for Western Oregon provides more information on the obligations of BLM for golden eagles under these acts, which is incorporated here by reference (USDI BLM 2013).

Issue 1

What levels of habitat for the golden eagle would be available under each alternative?

Summary of Analytical Methods

In this analysis, the BLM considered nesting habitat for golden eagles to be mature forests with multi-layered canopy and structurally-complex forests within the nine counties with historical breeding territories. During preliminary analyses, BLM considered nesting habitat only within proximity of large patches of open habitat. The BLM evaluated nesting habitat within 4, 6, and 10 miles of open habitat that was at least 100 acres; results indicated that each of these distances encompassed most of the BLM-administered lands within the counties with historic golden eagle nesting. Based on these preliminary results, and to simplify analytical procedures, the BLM assumed that all BLM-administered lands within the nine counties could provide nesting habitat for golden eagles, irrespective of distance to open habitat.

This issue presents both an analysis of the direct and indirect effects of alternative implementation on golden eagle habitat in the decision area and an analysis of the cumulative effects on golden eagle habitat of past, present, and reasonably foreseeable future actions, including land management activities on BLM-administered lands and non-BLM-administered lands in the planning area. The BLM modeled habitat on non-BLM-administered lands within the planning area using the 2012 GNN structural condition.

The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014, pp. 196-197).

Affected Environment and Environmental Effects

There are 789,751 acres of nesting habitat for golden eagles on BLM-administered lands in the decision area (**Figure 3-173**). Of the forested lands capable of providing nesting habitat, 41 percent is currently nesting habitat in the decision area.

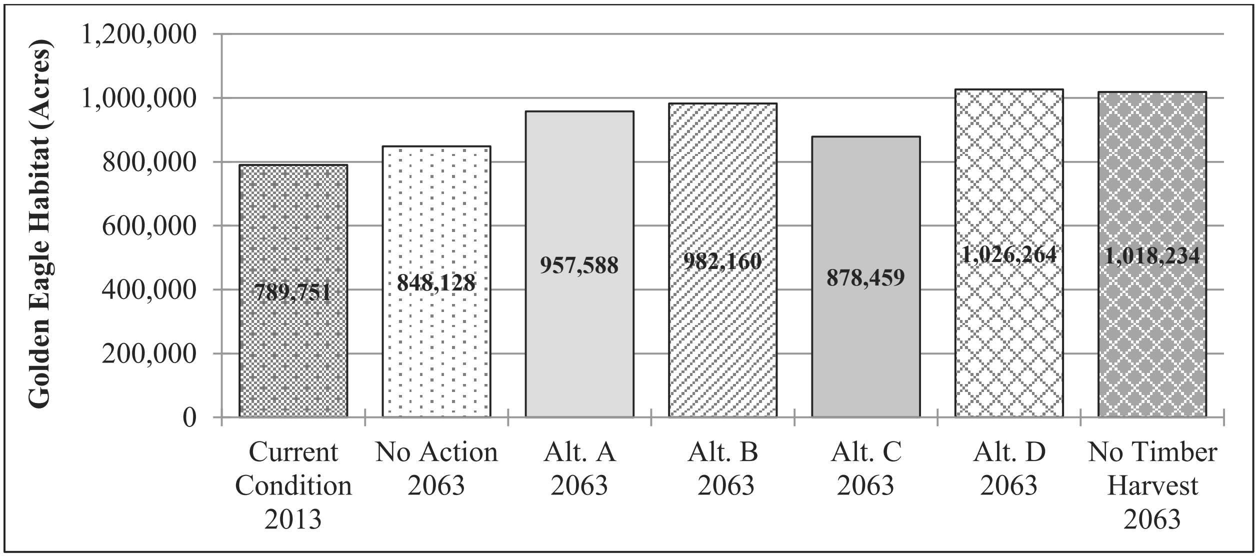

Figure 3-173. Golden eagle habitat in the decision area.

There are 3,225,904 acres of nesting habitat for golden eagles across all land-ownerships in the planning area (**Figure 3-174**). Of the forest land capable of providing nesting habitat, 24 percent is currently nesting habitat in the planning area. BLM-administered lands provide 24 percent of the available nesting habitat for golden eagles.

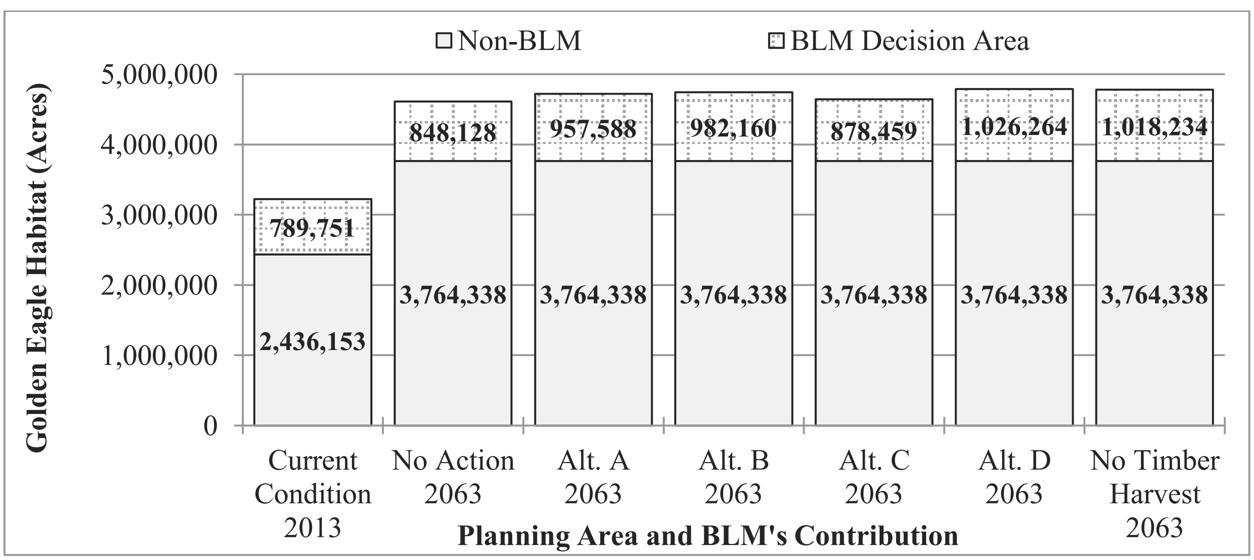

Figure 3-174. Golden eagle habitat in the planning area.

Under the No Timber Harvest Reference Analysis, there would be 1,018,234 acres of golden eagle nesting habitat in 50 years in the decision area (**Figure 3-173**). Under all action alternatives and the No Action alternative, the amount of golden eagle habitat on BLM-administered lands would increase between 7 to 30 percent. Habitat development under the action alternatives would be 86 to 101 percent of the habitat development as under the No Timber Harvest Reference Analysis. Alternative D would provide the most golden eagle habitat development and would actually surpass habitat development under the No Timber Harvest Reference Analysis. Alternative C would provide the least habitat development. The No Action alternative would produce 83 percent as much habitat as under the No Timber Harvest Reference Analysis. Alternatives A, B, C, and the No Action alternative would have a 1 to 8 percent loss of golden eagle habitat in the first two decades (the three decades for the No Action alternative), but additional habitat would develop in subsequent decades that would surpass current conditions (**Appendix R**).

At the planning area scale, the No Timber Harvest Reference Analysis would lead to 4,782,572 acres of golden eagle nesting habitat in 50 years (**Figure 3-174**). Golden eagle habitat would increase by 43 to 49 percent under the alternatives in 50 years in the planning area. Differences in habitat development among Alternatives A, B, and D would be indistinguishable since they are within 1 percent of the No Timber Harvest Reference Analysis. Alternative C and the No Action alternative would yield less golden eagle habitat at the planning area scale, but the difference is insubstantial (3 to 4 percent less than the No Timber Harvest Reference Analysis). The action alternatives would have a less than a 2 percent loss of golden eagle habitat in the first two decades (the first three decades for the No Action alternative), but additional habitat would develop in subsequent decades that would surpass current conditions (**Appendix R**).

Under all alternatives, the BLM would restrict activities near golden eagle nests that would disrupt nesting during the breeding season. Therefore, the BLM assumes that there would not be any disruption effects to nesting golden eagles under any of the alternatives.

Overall, the BLM expects that increases in nesting habitat coupled with management direction that would avoid disruption of breeding and nesting activities would encourage golden eagle population growth with the decision and planning areas. There would be little difference in effects among the alternatives, since habitat development would vary by no more than 4 percent among the alternatives.

Overall, the BLM expects golden eagle populations in the decision area and planning area to remain stable under the No Action Alternative and the action alternatives. Habitat availability for golden eagles increases under the alternatives and there is no newly identified threat that BLM expects to lead to a downward trend in the population of nesting golden eagles. There would be little differentiation in effects among the alternatives, since habitat development would vary by no more than 4 percent among the alternatives and seasonal restrictions would avoid disruption of golden eagle nesting under all alternatives.

Appendix R contains additional information and supporting data on golden eagles.

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Greater Sage-Grouse

Key Points

- There would be no discernable difference in effects to Greater Sage-Grouse among the Alternatives A, B, C, or the No Action alternative, and those effects from grazing would remain the same as under the current conditions. Alternative D, which would eliminate grazing, would facilitate invasive plant species expansion and contribute to the loss of habitat.

Background

On March 23, 2010, the U.S. Fish and Wildlife determined that the Greater Sage-Grouse (*Centrocercus urophasianus*) warrants the protection under the Endangered Species Act, but listing of the species is precluded by the need to address higher priority species (75 FR 13910). There are five populations of Greater Sage-Grouse in Oregon: Northern Great Basin, Western Great Basin, Baker, Central Oregon, and Klamath Falls (BLM 2013b). Only the Klamath Falls population is within the planning area. The Klamath Falls population had few birds at four leks in 1993 (BLM 2008), but there have been no more recent sightings of individuals of this population despite periodic surveys (BLM 2013b). In contrast, the other four populations in Oregon have minimum population estimates from 835 males to 9,114 males. In total, there are at least 20,000 Greater Sage-Grouse in Oregon (USFWS 2014). The U.S. Fish and Wildlife Service identified that overhunting in the late 1800's and early 1900's, habitat loss, habitat degradation, and habitat fragmentation have led to the decline of Greater Sage-Grouse populations (75 FR 13962). However, there is no basis that recreational hunting of sage-grouse is currently at a level that it poses a threat to the species. Current threats to Greater Sage-Grouse include loss of habitat through urbanization, energy development, invasive species (e.g., juniper, cheatgrass), intensive grazing, and wildfire. Habitat for the Greater Sage-Grouse is large, intact expanses of sagebrush shrubland (BLM 2013b).

Treatment of encroaching juniper affects the quantity of Greater Sage-Grouse habitat (BLM 2013b). The effects on Greater Sage-Grouse from livestock grazing are mixed. Livestock grazing can benefit Greater Sage-Grouse habitat by reducing fuel loading which would protect intact sagebrush habitat and would increase habitat extent and continuity. Livestock grazing can reduce the spread of invasive grasses if applied annually before the grasses have cured. Light to moderate grazing does not appear to reduce perennial bunchgrass cover which is important to maintain as cover from predation of Greater Sage-Grouse during nesting. However, heavy livestock grazing can reduce perennial bunchgrass cover, which would increase risk of predation and facilitate cheatgrass invasion. Livestock may also trample birds or nests or disrupt lekking or nesting behavior. When all rangeland health standards have been met, then grazing management is adequate to maintain herbaceous vegetation adequate to provide cover for Greater Sage-Grouse.

Issue 1

What levels of habitat for the Greater Sage-Grouse would be available under each alternative?

Summary of Analytical Methods

For this analysis, the BLM considered habitat for the Greater Sage-Grouse to be sagebrush habitat within Klamath County in the planning area (78 FR 61459). The BLM tabulated the amount of sagebrush habitat acres using 2012 GNN ecological systems codes for non-forest on all lands. **Appendix R** contains more details on classifying habitat for this species. The Analysis of the Management Situation for the RMPs for

Western Oregon provides more information on habitat trends and threats to the species, which is incorporated here by reference (USDI BLM 2013, p. 145).

Affected Environment and Environmental Effects

There are 244,934 acres of Greater Sage-Grouse habitat within the planning area, of which, 63,877 acres is within the decision area. However, this habitat within the decision area has not been occupied since 1993. Management direction common to all alternatives would treat and remove encroaching, invasive juniper within Greater Sage-Grouse habitat in the decision area similarly among all alternatives.

Under Alternatives A, B, and C, the BLM would reduce the acreage available for grazing by 27 percent (from 495,190 acres to 359,049 acres). However, the acreage in allotments that would be actively grazed would not change substantially. In 2013, there were 354,633 acres of allotments actively grazed; the BLM expects this approximate level of grazing would continue under Alternatives A, B, and C, and is roughly the same level of active grazing currently under the No Action alternative (L. Crumley, BLM, personal communication, 2014). The Grazing section contains more information. Therefore, there would be no discernable difference in effects from grazing to Greater Sage-Grouse among the Alternatives A, B, C, or the No Action alternative, and those effects from grazing would remain the same as under the current conditions. Under Alternative D, grazing would be eliminated on BLM-administered lands. The elimination of permitted grazing would increase the likelihood of undesired levels of bunchgrass mortality following fire, and thereby facilitate invasive plant species expansion, such as juniper, which would contribute to loss of habitat and habitat degradation for the Greater Sage-Grouse (USDI BLM 2013b). However, elimination of livestock grazing would also benefit Greater Sage-Grouse by removing the risk of trampling, and disruption of lekking and nesting behaviors by livestock.

Appendix R contains additional information and supporting data on greater sage grouse.

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Gray Wolf

Key Points

- The amount of habitat for gray wolves will not change amongst the alternatives, given the plasticity of gray wolves in using the landscape and their resilience to different land-use management regimes.
- The opportunities for conflicts between gray wolves and livestock would be reduced under the action alternatives.

Background

The U.S. Fish and Wildlife Service originally listed subspecies or regional populations of wolves (i.e., the timber wolf, *Canis lupus lycaon*) under the Endangered Species Preservation Act of 1966 on March 11, 1967 (32 FR 4001). On March 9, 1978, the U.S. Fish and Wildlife Service listed the gray wolf (*C. lupus*) as an endangered species under the Endangered Species Act at the species level on March 9, 1978 (43 FR 9607). Between 2003 and 2009, the U.S. Fish and Wildlife Service published several rules delisting gray wolves in most of the United States (except for populations in the southwestern United States and Mexico). As a result of litigation, the listing status of the gray wolf in 2010 was the same as it was in 1978 (78 FR 35666). The U.S. Fish and Wildlife Service delisted the Northern Rocky Mountain distinct population segment of the gray wolf (except in Wyoming) on May 5, 2011 (76 FR 25590).The U.S. Fish and Wildlife Service currently considers the gray wolves in the Pacific Northwest to be the subspecies *Canis lupus nubilus*. The U.S. Fish and Wildlife Service proposed to remove gray wolves, including those in the Pacific Northwest, from the list of endangered and threatened wildlife under the Endangered Species Act on June 13, 2013 (78 FR 35664). Critical habitat for the gray wolf has not been designated by the U.S. Fish and Wildlife Service in Oregon.

There is one known pack of gray wolves in the planning area, called the Rogue pack (which includes the radio-collared male [OR7] who became pack alpha). The Rogue pack's area of use includes portions of the Klamath Falls Field Office and Medford District (**Figure 3-175**). There is also a second area of known wolf activity (called the Keno pair) in the planning area where a pair of wolves has shown repeated use. A wolf had been using the Keno area since December 2014, but in January 2015 the Oregon Department of Fish and Wildlife documented use by a second wolf which establishes this as an area of known wolf activity (ODFW 2015; **Figure 3-175**).

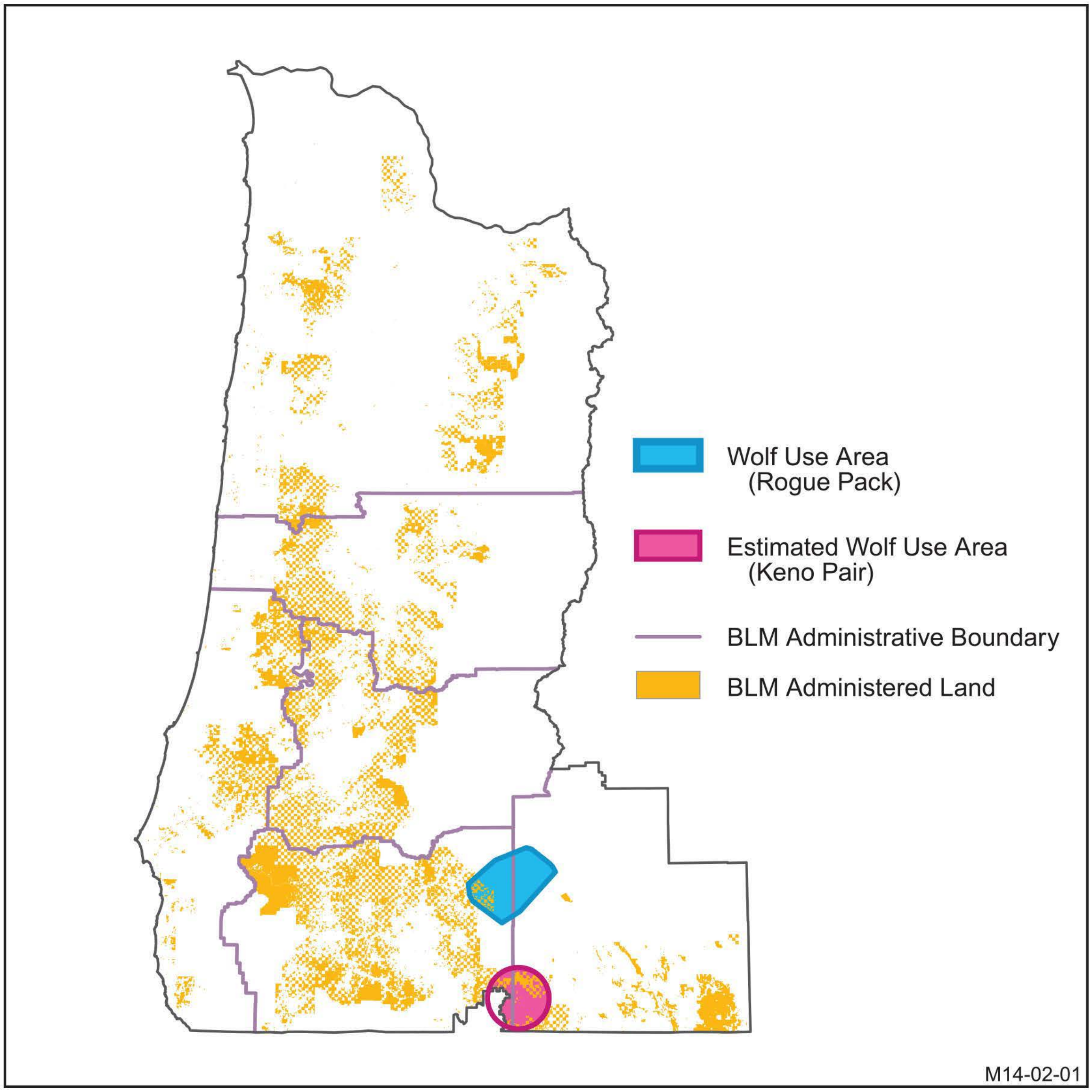

Figure 3-175. Known areas of wolf activity in the planning area.

OR7 is a radio-collared male gray wolf whose movements are tracked by Oregon Department of Fish and Wildlife. OR7 dispersed from the Imnaha pack located in northeastern Oregon in September 2011. In March 2013, OR7 moved into Klamath County, Oregon, and found a mate in May 2014. Oregon Department of Fish and Wildlife biologists confirmed that OR7 and his mate had produced pups, and thus became a "pack" on June 4, 2014 (ODFW 2014). Genetic evidence suggests that OR7's mate (the alpha female) is a wolf with heritage from two other packs in northeastern Oregon: the Snake River and Minam packs. Prior to the Rogue pack formation, there had been dispersing wolves documented in western Oregon but no verified wolf packs (78 FR 35679, ODFW 2010). A minimum of 14 adult wolves (dispersing individuals, not associated with a pack) were known to live in Oregon as of 2010 (ODFW 2010). As of January 2015, ODFW has delineated 12 areas of known wolf activity in northeastern Oregon and two areas of known wolf activity (Rogue pack and Keno pair) in southwestern Oregon (ODFW 2015).

Wolves are highly mobile habitat generalists with large home ranges. They persist where wild ungulate (e.g., deer and elk) populations are adequate to provide prey and conflict with humans and livestock are low (78 FR 35680). There is no known future condition that would cause a decline in ungulate prey populations sufficient to affect the gray wolf throughout its range. Attributes of wolf habitat include: forest cover, public land, high ungulate density, and low livestock density. Conversely, low forest cover, high human density, and year-round livestock presence makes lands unsuitable as wolf habitat. Due to the wolves being habitat generalists, the U.S. Fish and Wildlife Service does not consider them vulnerable to climate change.

There is sufficient habitat in the planning area to support gray wolves. Land-use practices do not appear to be affecting viability of wolves and do not need modification to conserve the subspecies (78 FR 35680). Land development projects can render some areas less suitable for wolves, but land-use restrictions are not necessary to ensure conservation of the subspecies. Wolves in northwest Montana exist amidst a complex arrangement of different land ownerships and management practices (public land, small private-land holders, and large industrial-land holders), and it would not be unusual for wolves to traverse all of these land-holders in a single day (ODFW 2010). Land ownership patterns in Oregon are similar to those in northwestern Montana, so wolves in Oregon could similarly traverse multiple ownerships in a day. Management plans on public lands are more than adequate to support viable wolf populations across the range of the subspecies (78 FR 35681). National Parks and Monuments provide refugia from hunting, trapping, control activities and may act as source for dispersing wolves. Human tolerance and an active program to eradicate gray wolves were the primary reasons wolves were extirpated from portions their historical range.

In this analysis, the BLM did not specifically model habitat for the gray wolf in the decision area, because gray wolves are habitat generalists, have large home ranges, are capable of dispersing long distances, and are resilient to land-use practices. The amount of habitat for gray wolves would not change under the alternatives, given the plasticity of gray wolves in using the landscape. Thus, a gray wolf habitat model would not be informative or discerning among the alternatives.

The size and boundaries of a given wolf pack's territory vary annually based on prey movements or movements of other packs (ODFW 2010). Territories of wolf packs first to colonize an area tend to be larger (e.g., 460 square miles) and as packs fully occupy the landscape, territories become smaller (e.g., 185 square miles). Pups eventually leave their parent's pack and either establish a new territory or join an existing pack. On average, male wolves disperse at 28.7 months old and travel 60 miles, and females disperse at 38.4 months and travel 48 miles. Dispersal distances of 221 miles have been reported.

In time, gray wolves will likely establish additional packs in the planning area. Activity of the wolf pack is centered at or near the den or rendezvous sites as adult pack-members hunt and bring food to the pups from late-April until September (ODFW 2010). Wolf dens can be resilient to non-lethal disturbance by humans (78 FR 35681).

Issue 1

How would the alternatives affect opportunities for wolf-livestock conflict on BLM-administered lands?

Summary of Analytical Methods

The BLM assumed in this analysis that opportunities for wolf-livestock conflict would be the only meaningful effect of BLM management on wolf populations in the decision area. Wolf-livestock conflicts can potentially adversely affect wolf populations through conflicts with humans. The BLM assumed that the acreage available for grazing would generally correspond to the opportunities for wolf-livestock conflict. However, there are no quantifiable metrics to equate a specific acreage available for grazing to a specific rate of wolf-livestock conflicts.

The BLM assumed in this analysis that habitat changes in the decision area would not affect wolf populations. The U.S. Fish and Wildlife Service has noted that land-use practices do not appear to be affecting viability of wolves and do not need modification to conserve the subspecies (78 FR 35680).

Affected Environment and Environmental Effects

Under Alternatives A, B, and C, the BLM would reduce the acreage available for grazing by 27 percent (from 495,190 acres to 359,049 acres) but the acreage in allotments that is actively grazed would not change substantively. In 2013, there were 354,633 acres of allotments actively grazed and the BLM expects this approximate level of grazing would continue under Alternatives A, B, and C and is roughly the same level of active grazing currently under the No Action alternative (L. Crumley, BLM, personal communication, 2014). The Grazing section contains more information on grazing levels. Therefore, the opportunities for wolf-livestock conflict would remain the same as under current conditions, and there would be no discernable difference in impacts among the Alternatives A, B, C, or the No Action alternative. Under Alternative D, opportunities for wolf-livestock conflict would be minimized in the absence of livestock grazing on BLM-administered lands.

A reduction in the opportunities for wolf-livestock conflict would reduce potential adverse effects on wolves in the planning area, but there is no reasonable basis to quantifiably describe a difference in effects among the alternatives or on the gray wolf population.

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Marbled Murrelet

Key Points

- All alternatives would result in an increase in the amount of marbled murrelet high-quality nesting habitat and total nesting habitat in 50 years in the decision and planning areas.
- In the first decade, all alternatives would result in a slight decrease in the amount of high-quality nesting habitat. However, sufficient high-quality nesting habitat would develop by the second decade to surpass current amounts under all alternatives
- Under the No Action alternative and Alternative D, the BLM would identify and protect all future marbled murrelet sites. Alternatives A, B, and C would result in the loss of 9 percent (96), 1 percent (12), and 20 percent (210) future marbled murrelet sites, respectively, as a result of timber harvest in the Harvest Land Base in the absence of surveys.

Background

The U.S. Fish and Wildlife Service listed the marbled murrelet (*Brachyramphus marmoratus*) as a threatened species under the Endangered Species Act on October 1, 1992 (57 FR 45328). The U.S. Fish and Wildlife Service identified several anthropogenic threats to the marbled murrelet at the time of listing and in the Recovery Plan for the Marbled Murrelet (USDI FWS 1997), including—

- Habitat destruction and modification in the terrestrial environment from timber harvest and human development caused a severe reduction in the amount of nesting habitat;
- Unnaturally high rates of predation at nest sites resulting from forest "edge effects;"
- Existing regulatory mechanisms, such as land management plans (in 1992), were considered inadequate to ensure protection of the remaining nesting habitat and reestablishment of future nesting habitat; and
- Manmade factors such as mortality from oil spills and entanglement in fishing nets used in gill-net fisheries.

Subsequently, the U.S. Fish and Wildlife Service has reported in the 2004 Marbled Murrelet 5-Year Review (USDI FWS 2004) and 2009 Marbled Murrelet 5-Year Review (USDI FWS 2009) that there have been changes in the levels of these threats since the 1992 listing. Additional mechanisms, such as the Northwest Forest Plan, have been implemented since 1992 that affect land management in Oregon and have reduced threats to marbled murrelets (USDI FWS 2004). The remaining threats (i.e., habitat loss, high predation rates, mortality from oil spills or entanglement in fishing nets) remained unchanged following the 2004 Marbled Murrelet 5-Year Review and continue to be threats as reported in the 2009 Marbled Murrelet 5-Year Review. In the 2009 review, the U.S. Fish and Wildlife Service also identified additional environmental and anthropogenic factors in the marine environment that are new threats to the marbled murrelet as listed below:

- Environmental factors
    - Elevated levels of polychlorinated biphenyls in marbled murrelet prey species
    - Changes in prey abundance and availability
    - Changes in prey quality
    - Harmful algal blooms that produce bio-toxins leading to domoic acid and paralytic shellfish poisoning that have caused murrelet mortality
    - Climate change in the Pacific Northwest

- Anthropogenic factors
    - Derelict fishing gear leading to mortality from entanglement
    - Energy development projects (wave, tidal, and on-shore wind energy projects) leading to mortality
    - Disturbance in the marine environment (from exposures to lethal and sub-lethal levels of high underwater sound pressures caused by pile-driving, underwater detonations, and potential disturbance from high vessel traffic)

Nelson *et al.* (2006) completed a review of marbled murrelet biology and nesting habitat. The results included that—

- Marbled murrelets are secretive, non-colonial nesters that forage at sea and nest inland;
- The majority of marbled murrelets nest within 37 miles of the coast, although nests have been documented up to 52 miles inland in Washington and 47 miles inland in Oregon (R. Espinosa, BLM, personal communication, 2007);
- The most important component in the nesting habitat for the marbled murrelet is the presence of large platforms (i.e., limbs or other structures that are at least 4 inches in diameter with a substrate [moss or other duff] capable of forming a nest cup);
- Other important factors include vertical and horizontal cover location with respect to forest openings or edge, and height of platform. Platforms should be high enough to provide for jump-off departures and open enough to provide for stall landings, while still providing protection from predators and the weather;
- Nest trees documented in the Northwest Forest Plan area are greater than 19 inches (diameter at breast height) and greater than 98 feet tall. Nest trees are typically taller than the average non-nest tree; and
- Vertical cover (cover above the nest) is typically above 70 percent.

Forest stands that provide nesting habitat typically possess a high density of large trees with platforms, have multiple canopy layers, and are typically older. Studies summarized for Oregon indicate that the density of trees with platforms and the number of platforms in general were the most important variables in predicting marbled murrelet nesting habitat at the stand level (USDI BLM 2008).

There is a strong association between total marbled murrelet populations and total suitable habitat at the scale of the Northwest Forest Plan Area (Raphael *et al*. 2011, p. 44). The location, amount, and the distribution pattern of nesting habitat are predictors of the spatial distribution of marbled murrelets at sea (Raphael *et al.* in press). Raphael *et al.* found that inland areas with a greater amount of nesting habitat and high cohesion (a measure of connectivity related to the geometry of patches of habitat) had greater numbers of marbled murrelets at sea.

The U.S. Fish and Wildlife Service designated critical habitat for the marbled murrelet on May 24, 1996, (61 FR 26256); this designation included a description of the Primary Constituent Elements that support nesting, roosting, and other normal behaviors that are essential to the conservation of the marbled murrelet. The Primary Constituent Elements include: 1) forested stands containing large sized trees, generally more than 32 inches in diameter with potential nesting platforms at sufficient height, generally greater than or equal to 33 feet in height; and 2) the surrounding forested areas within 0.5 mile of these stands with a canopy height of at least one-half the site-potential tree height. Designated critical habitat also includes habitat that is currently unsuitable, but has the capability of becoming suitable habitat in the future. On October 5, 2011, critical habitat for the marbled murrelet was revised, removing acres in northern California and southern Oregon from the 1996 designation (76 FR 61599).

The Recovery Plan for the Marbled Murrelet (USDI FWS 1997) outlines the conservation strategy with both short- and long-term objectives. This recovery plan places special emphasis on the terrestrial environment for habitat-based recovery actions due to nesting occurring in inland forests.

In the short-term, specific actions identified as necessary to stabilize the population includes protecting occupied habitat and minimizing the loss of unoccupied but suitable habitat (USDI FWS 1997). Specific actions include maintaining large blocks of suitable habitat, maintaining and enhancing buffer habitat, decreasing risks of nesting habitat loss due to fire and windthrow, reducing predation, and minimizing disturbance. The designation of marbled murrelet critical habitat also contributes towards the initial objective of stabilizing the population size through the maintenance and protection of occupied habitat and minimizing the loss of unoccupied but suitable habitat.

Long-term conservation needs identified in the Plan include—

- Increasing productivity (abundance, the ratio of juveniles to adults, and nest success) and population size;
- Increasing the amount (stand size and number of stands), quality, and distribution of suitable nesting habitat;
- Protecting and improving the quality of the marine environment; and
- Reducing or eliminating threats to survivorship by reducing predation in the terrestrial environment and anthropogenic sources of mortality at sea.

The recovery plan identified six conservation zones throughout the listed range of the species: Puget Sound (Conservation Zone 1), Western Washington Coast Range (Conservation Zone 2), Oregon Coast Range (Conservation Zone 3), Siskiyou Coast Range (Conservation Zone 4), Mendocino (Conservation Zone 5), and Santa Cruz Mountains (Conservation Zone 6). The planning area includes all of Conservation Zone 3 and the northern portion of Conservation Zone 4 (**Figure 3-176**). Recovery zones are the functional equivalent of recovery units as defined by U.S. Fish and Wildlife Service policy.

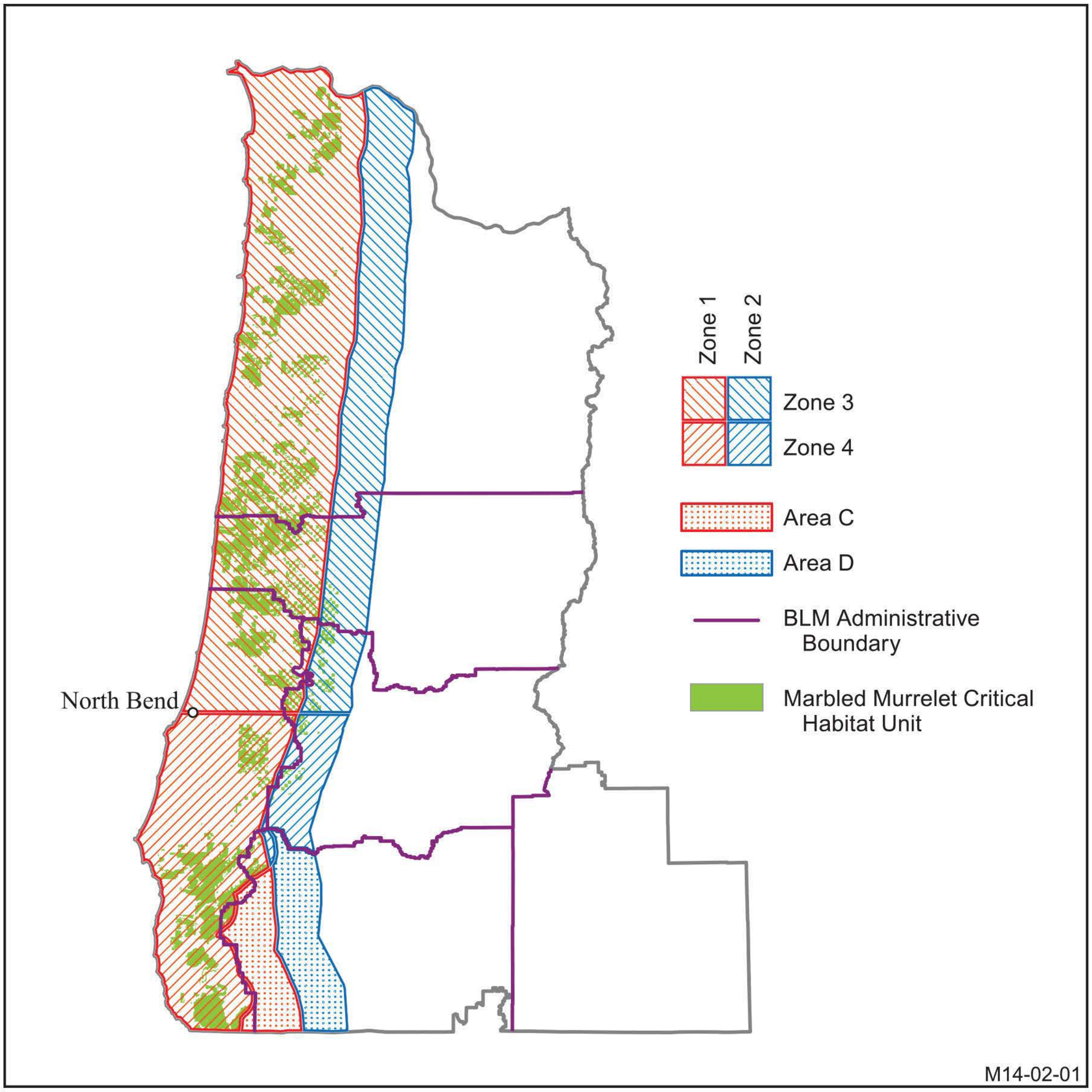

Figure 3-176. Range and management zones of the marbled murrelet.

The Northwest Forest Plan established two management zones for the marbled murrelet: Zone 1 from the coast to approximately 35 miles inland, and Zone 2 from the eastern boundary of Zone 1 to approximately 50 miles inland from the coast (**Figure 3-176**).

Systematic surveys in the Medford District have indicated that marbled murrelets are likely confined to the hemlock-tanoak vegetation zone (USDA FS and USDI BLM 2002, USDI FWS 2002 Memo). The portion formally considered part of the range of the marbled murrelet in the Medford District is depicted as Area C and Area D in **Figure 3-176**.

Falxa *et al.* (2014) reported that the 2013 at-sea population estimate for marbled murrelets in Conservation Zone 3 was 7,896 birds and 5,993 birds in Conservation Zone 4. The 2013 population estimate for all five conservation zones is 19,617 marbled murrelets. Between 2001 and 2013 the combined marbled murrelet population across all five conservation zones exhibits a weak downward trend (1.2 percent decline per year) while in Conservation Zone 3 (0.5 percent increase per year) and Conservation Zone 4 (1.6 percent increase per year) marbled murrelets exhibit weak upward trends. Strong (2013) found no evidence of a trend in marbled murrelet populations within either Conservation Zone 3 or 4 from 2000 to 2012.

Previously, Miller *et al.* (2012) reported that the marbled murrelet population was declining throughout its range (estimated at 29 percent decline for the listed population from 2001 to 2010). The annual population decline during 2001 to 2010 was 3.7 percent. Falxa *et al.* (2014) found that it is unclear what is driving recent population trends and also that it is premature to conclude that the marbled murrelet population decline observed between 2001-2010 is continuing or that the observations during 2011-2013 indicate a change in the declining trend.

The Analysis of the Management Situation for the RMPs for Western Oregon provides more information on the species range, population trend, and threats, which is incorporated here by reference (USDI BLM 2013, pp. 143, 149-150).

Issue 1

What levels of nesting habitat for the marbled murrelet would be available under each alternative?

Summary of Analytical Methods

In this analysis, the BLM considered nesting habitat for the marbled murrelet to be young forests with structural legacies, mature forests, and structurally-complex forests within the range of the marbled murrelet in the planning area (**Figure 3-176**).

The BLM divided nesting habitat for the marbled murrelet into two categories: high-quality nesting habitat and low-quality nesting habitat. In this analysis, the BLM assumed that structurally-complex forest stands within the range of the marbled murrelet represent high-quality nesting habitat, which provides trees and platforms suitable for nesting on a regular, reliable basis. Based on CVS data, the BLM estimates the average platform density in high-quality nesting habitat is 41.8 to 54.2 platforms/acre. Young stands with structural legacies and mature stands represent lower-quality nesting habitat, which may have trees and platforms suitable for nesting murrelets but the frequency and density of such structures is lower. The BLM estimates the average platform density in lower-quality nesting habitat is 15.3 to 18.1 platforms/acre.

This issue presents both an analysis of the direct and indirect effects of alternative implementation on marbled murrelet habitat in the decision area and an analysis of the cumulative effects on marbled murrelet habitat of past, present, and reasonably foreseeable future actions, including both land management on BLM-administered lands and non-BLM-administered lands in the planning area.

The BLM modeled habitat on non-BLM-administered lands within the planning area using the 2012 GNN structural condition. The BLM modeled the structural condition on non-BLM-administered lands as continuing to provide the same distribution of habitat through time as the current condition, except in Forest Service reserves (i.e., Late-Successional Reserves and Congressionally Reserved lands). The BLM modeled structural conditions continuing to develop on Forest Service reserve lands through time (*Appendix R*). This modeling of Forest Service reserve lands assumed that habitat would not develop on Forest Service reserve lands that experience wildfire in the modeling (see the vegetation modeling section at the beginning of Chapter 3).For the purpose of this analysis, the BLM assumed that the future distribution of habitat conditions on non-BLM-administered lands and burned, Forest Service reserves would continue to reflect the current distribution of habitat conditions. On private lands, the assumption that the future distribution of habitat conditions would remain the same as current conditions likely overestimates the amount of nesting habitat since Raphael *et al.* (2011) found that 33.4 percent of high-quality nesting habitat was lost between 1994/1996 and 2006/2007. On State and Forest Service non-reserve lands, this assumption is likely to be an underestimate of the future development of habitat. The BLM acknowledges that the spatial arrangement of structural conditions would change in the future, but lacks information to make more specific projections of how structural conditions would change over time on non-BLM-administered lands. This assumption is consistent with the assumption used in the analysis of forest structure and spatial pattern in the 2008 RMP/EIS, which describes the limitations on analyzing future changes on non-BLM-administered lands and is incorporated here by reference (USDI BLM 2008, pp. 532-536).

The GNN structural condition categories used for estimating high-quality nesting habitat on non-BLM-administered lands include structural components and provide a reasonable estimate of high-quality nesting habitat in the planning area for context. However, the GNN structural condition categories are not effective for estimating lower-quality nesting habitat. Initial calculations of total nesting habitat at the planning area scale using the GNN structural condition categories were unreasonably high when compared to Raphael *et al.* (2011). The GNN structural condition categories cannot distinguish young stands with structural legacies from young stands without structural legacies, and would therefore include all young stands in lower-quality nesting habitat, grossly overestimating the amount of lower-quality nesting habitat and total marbled murrelet nesting habitat. Therefore, for this analysis, the BLM limits discussion of marbled murrelet nesting habitat at the planning area scale to high-quality nesting habitat only, because of the limitations on interpreting the data available for non-BLM-administered lands.

The BLM assessed habitat connectivity by calculating the amount of "edge habitat" and "core habitat" on BLM-administered lands. Following Raphael *et al.* (2011, p. 19), the BLM defined core habitat as the interior portion of a contiguous block of nesting habitat that is more than 295 feet from non-habitat. BLM also defined edge habitat as nesting habitat that within 295 feet of non-habitat. The distance to edge or core habitat is based on findings that marbled murrelets have reduced nest success along forested edges due to nest depredation, predominantly by species of corvids (Raphael *et al.* 2011, McShane *et al.* 2004). The BLM assumed that since the risk of nest predation by corvids is greater along habitat edges, there would be less risk of nest predation within larger patches of nesting habitat. Although there are no quantified thresholds for the amount of core habitat needed by marbled murrelets or the effects of changes in patch size, the BLM assumed in this analysis that the quality of nesting habitat would increase as the proportion of available habitat in core habitat increases and as patch size increases.

The BLM did not forecast population trends of the marbled murrelet because of the uncertainty surrounding recent population trends as reported in Falxa *et al.* (2014) and discussed previously. In addition, there are numerous threats to marbled murrelets in the marine environment from environmental sources (e.g., changes in prey abundance, distribution, and quality or harmful algal blooms) or anthropogenic sources (e.g., derelict fishing gear and disturbance from vessel traffic) that are beyond the scope of land management decisions on BLM-administered lands.

Affected Environment and Environmental Effects

There are 493,968 acres of total nesting habitat for the marbled murrelet on BLM-administered lands in the decision area, of which, 233,219 acres is high-quality nesting habitat (**Table 3-254**). Of the forested lands capable of providing nesting habitat in the decision area, 56 percent is currently nesting habitat, and 26 percent is currently high-quality nesting habitat.

Table 3-254. Current marbled murrelet nesting habitat.

Marbled Murrelet Habitat	Decision Area		Planning Area	
	(Acres)	(% of Habitat Capable)	(Acres)	(% of Habitat Capable)
High-Quality Nesting Habitat	233,219	26%	573,150	9%
Lower-Quality Nesting Habitat	260,749	29%	-	-
Total Nesting Habitat	**493,968**	**56%**	-	-
Total Habitat-Capable Acres	**885,590**	**100%**	**6,638,960**	**100%**

Under the No Timber Harvest Reference Analysis, there would be 840,024 acres of nesting habitat and 319,070 acres of high-quality nesting habitat on BLM-administered lands in 50 years (**Figure 3-177**). In the first decade, all alternatives would reduce the amount of high-quality nesting habitat: Alternatives A, B, and D would have a 1 percent loss, the No Action alternative would have a 3 percent loss, and Alternative C would have a 4 percent loss. However, sufficient high-quality nesting habitat would develop by the second decade to surpass current amounts under all alternatives and the No Action alternative (*Appendix R*). The amount of total nesting habitat and the amount of high-quality nesting habitat would continue to increase after the second decade under all alternatives (**Figure 3-177**). Even though there would be a decline in the abundance of marbled murrelet nesting habitat in the first decade, there is no basis on which to conclude the temporary loss of 1-4 percent of available nesting habitat crosses a threshold, resulting in substantial changes to the marbled murrelet population. This slight, temporary loss of nesting habitat from Conservation Zones 3 and 4 could arrest, or possibly reverse, the observed upwards population trends in Conservation Zones 3 and 4 (0.5 percent and 1.6 percent increase per year, respectively). However, it seems unlikely that the loss of 1-4 percent of the available nesting habitat from Conservation Zones 3 and 4 in the first decade would lead to a catastrophic population collapse given that the marbled murrelet populations in Conservation Zones 3 and 4 are apparently increasing.

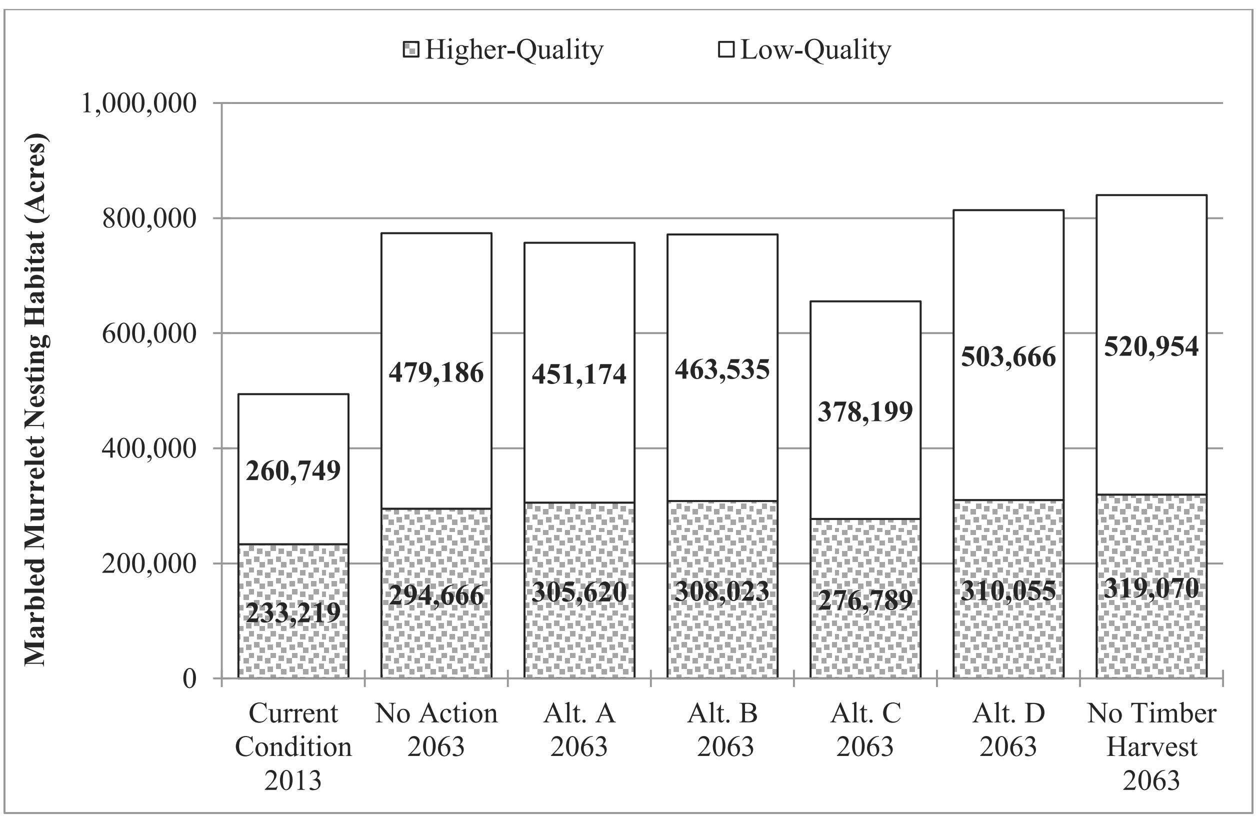

Figure 3-177. Marbled murrelet nesting habitat in the decision area.

Currently, the average patch size of marbled murrelet nesting habitat is 33.6 acres. Under the No Timber Harvest Reference Analysis, average patch size would increase to 69.7 acres in 50 years. The average patch size of marbled murrelet nesting habitat would decrease under Alternative C, but would increase under all other alternatives in 50 years (**Table 3-255**).

Table 3-255. Marbled murrelet nesting habitat patch metrics.

Alternative	Mean Patch Size (Acres)	Edge vs. Core Habitat		
		Edge Habitat (Acres)	Core Habitat (Acres)	Percent Core (%)
Current Condition (2013)	33.6	311,889	182,079	37%
No Action (2063)	44.3	467,594	306,258	40%
Alt. A (2063)	43.2	451,883	304,911	40%
Alt. B (2063)	45.1	460,710	310,848	40%
Alt. C (2063)	29.6	405,013	249,975	38%
Alt. D (2063)	56.5	468,768	344,953	42%
No Timber Harvest (2063)	69.7	472,978	367,046	44%

Currently, 37 percent of nesting habitat is core habitat, and this percentage would increase in 50 years under all alternatives (**Table 3-255**). Alternative C would have the smallest increase in core habitat, while Alternative D would have the greatest increase, only slightly less than the No Timber Harvest Reference Analysis.

Alternatives D, B, and A (in descending order) would provide nesting habitat in a configuration that would lead to reduced risk of nest predation (e.g., larger patch size, less edge habitat). In contrast, Alternative C would exacerbate nest predation by reducing patch size and providing the greatest amount of habitat subject to edge effects.

The BLM-administered lands currently contribute 41 percent of the high-quality nesting habitat for the marbled murrelet in the planning area. In the planning area, there are currently 573,150 acres of high-quality nesting habitat for the marbled murrelet across all ownerships, or 9 percent of the forest land capable of providing nesting habitat (**Table 3-254**). Raphael *et al.* (2011) report that approximately 36 percent of habitat-capable Federal lands was higher suitability nesting habitat and 11 percent of habitat-capable non-Federal lands was high suitability nesting habitat in 2006/2007 in Oregon within Zone 1. Thus, the estimate of high-quality nesting habitat across all ownerships as modeled in this analysis are slightly lower, but comparable to estimates in Raphael *et al.* (2011).

Within the planning area, high-quality nesting habitat would increase from 9 percent of all habitat-capable to 12 percent of all habitat-capable land under all alternatives, including the No Timber Harvest Reference Analysis, in 50 years (*Appendix R*). At the planning area scale, there is only slight differentiation in amount of high-quality nesting habitat development among the alternatives, which is only slightly less than under the No Timber Harvest Reference Analysis (**Figure 3-178**).

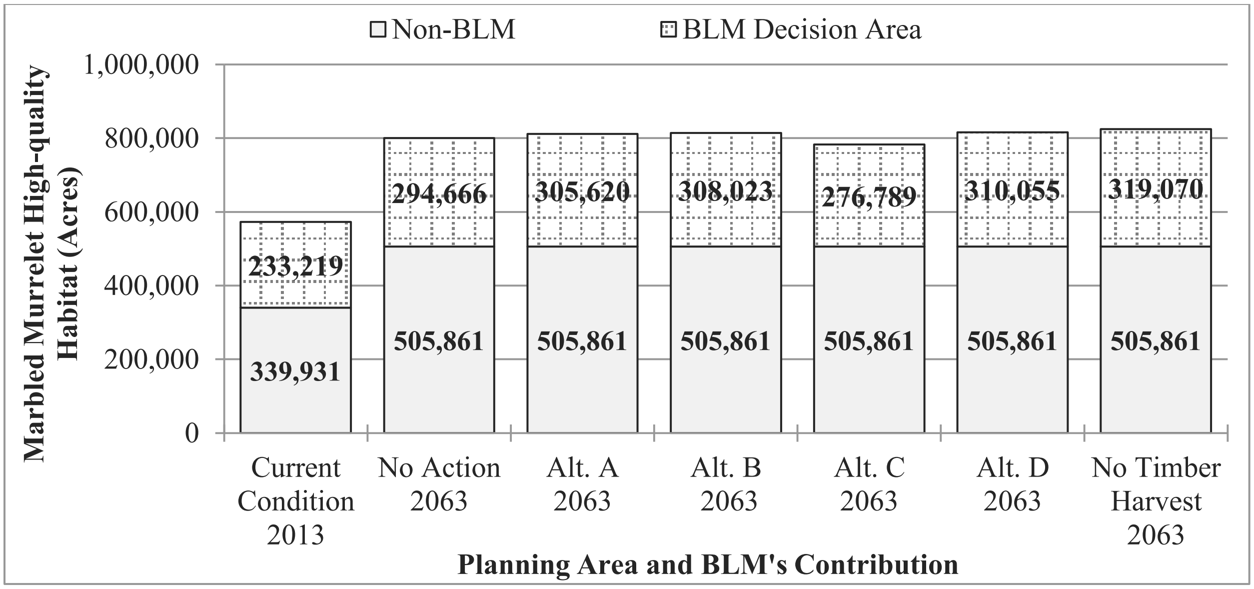

Figure 3-178. Marbled murrelet high-quality nesting habitat in the planning area.

There are 480,369 acres of designated marbled murrelet critical habitat in the decision area and 1,338,444 acres in the planning area. Currently, 59 percent (273,174 acres) of designated marbled murrelet critical habitat on BLM-administered lands is nesting habitat, and 34 percent (154,331 acres) is high-quality nesting habitat.

Within designated critical habitat, the No Timber Harvest Reference Analysis would result in an increase in nesting habitat from 59 percent of all habitat-capable land in 2013 to 97 percent of all habitat-capable land in 50 years and an increase in the amount of high-quality nesting habitat from 34 percent of all habitat-capable land to 43 percent of all habitat-capable land in 50 years (*Appendix R*). All action alternatives and the No Action alternative would develop more nesting habitat and high-quality nesting habitat within designated critical habitat for the marbled murrelet in 50 years. Alternatives A, D, and the No Action alternative would result in increases in nesting habitat in designated critical habitat that are almost indistinguishable from the No Timber Harvest Reference Analysis. Alternative C would have the smallest increase in nesting habitat and high-quality nesting habitat (**Figure 3-179**).

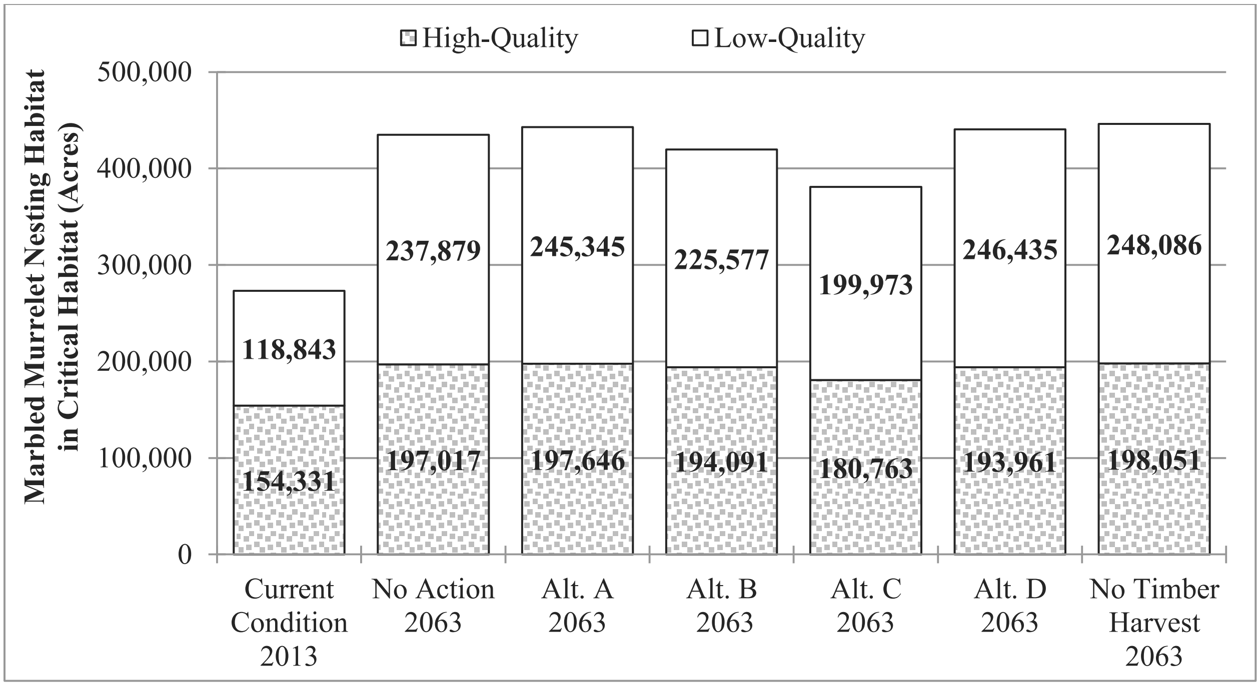

Figure 3-179. Marbled murrelet nesting habitat in critical habitat in the decision area.

At the planning area scale, the No Timber Harvest Reference Analysis would result in an increase in high-quality nesting habitat within designated critical habitat from 24 percent of all habitat-capable land in 2013 to 37 percent of all habitat-capable land in 50 years (*Appendix R*). The development of high-quality nesting habitat for the marbled murrelet would be nearly indistinguishable among Alternatives A, B, D, and the No Action alternative in the planning area. These alternatives, including No Action, would be within 1 percent of the No Timber Harvest Reference Analysis results. Alternative C would develop the least high-quality nesting habitat within designated critical habitat, which would be 3 percent less than the No Timber Harvest Reference Analysis in the planning area (**Figure 3-180**).

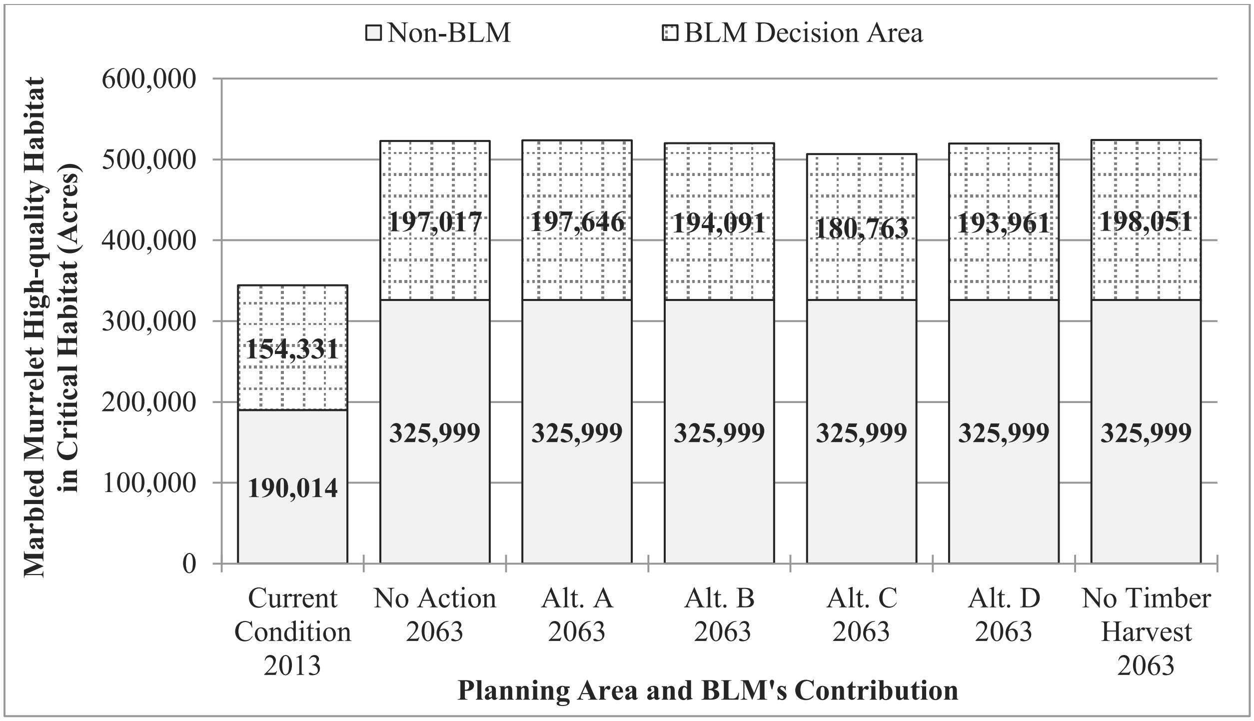

Figure 3-180. High-quality marbled murrelet nesting habitat in designated critical habitat in the planning area.

Opportunities for marbled murrelet nesting would increase under all alternatives, including No Action, as the amount of nesting habitat and high-quality nesting habitat would increase. Increased nesting opportunities and nesting habitat would encourage population growth, thereby aiding species recovery. As noted above under Background, there is a strong association between total marbled murrelet populations and total habitat (Raphael *et al*. 2011). Alternative D would provide the greatest increase in nesting opportunity, and therefore the greatest contribution to species recovery, but Alternatives B and A (in descending order) would provide similar amounts of nesting habitat and opportunities. Alternative C and the No Action alternative would provide less of an increase in nesting opportunities, but would still contribute to increases in the marbled murrelet population. Alternatives D, B, and A, and the No Action alternative would also provide nesting habitat in configurations (larger patches) that would reduce nest predation, which would further aid successful marbled murrelet reproduction and population growth. Nesting habitat configuration under Alternative C would exacerbate nest predation, limiting opportunities for population growth. Overall, Alternative D would provide the most favorable habitat conditions for improving marbled murrelet nest success and potential population growth. Alternatives B, A, and No Action (in descending order) would provide comparable, but slightly less favorable habitat conditions, compared to Alternative D. Alternative C would provide the least improvement to marbled murrelet nesting opportunities and would increase the risk the of nest predation.

Issue 2

How would the alternatives affect known and future occupied marbled murrelet sites?

Summary of Analytical Methods

The BLM used existing data as mapped within the BLM corporate murrelet database to identify currently known, occupied murrelet sites (GeoBOB, 2013).

The BLM forecast the number of marbled murrelet sites that the BLM would identify in the future by applying observed detection rates of occupancy and the mean size of occupied stands. Through preliminary analysis of previous surveys, the BLM found marbled murrelet occupancy in 24.4 percent of survey polygons within 0 to 25 miles of the coast (21 of 86 survey polygons) and in 5.6 percent of survey polygons within 25 to 50 miles of the coast (39 of 696 survey polygons) (USDI BLM, unpublished data, 2014). The survey polygons examined in this preliminary analysis represent 62,339 acres of survey effort, which is a partial data-set of the total survey effort. There is approximately 26,000 acres of additional survey effort, but that data was not available at the time of this analysis. The BLM applied these detection rates to the amount of marbled murrelet nesting that would be within the Harvest Land Base under each alternative. The results are displayed in **Figure 3-181**.

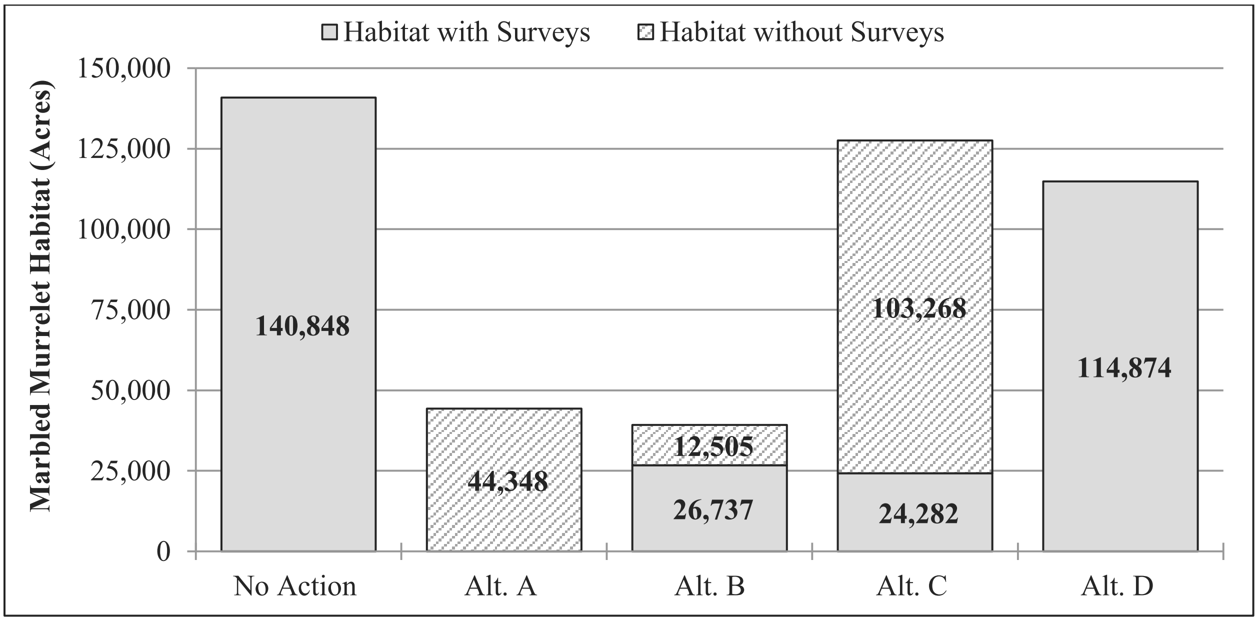

Figure 3-181. Surveys of marbled murrelet nesting habitat in the Harvest Land Base by alternative from 2013 to 2063.

The average size of survey polygons is 60.2 acres (USDI BLM, unpublished data, 2014), and the BLM assumed that survey polygons are the best available dataset depicting marbled murrelet occupancy at the stand level. The BLM divided the acreage of nesting habitat in the Harvest Land Base in 2013 by the average size of survey polygons to forecast the number of future, occupied sites that may exist in the Harvest Land Base in the future. While this forecast uses spatial data, the BLM did not forecast the specific location of future, occupied sites. Thus, the BLM did not specifically and separately analyze habitat development in or near these forecast sites. The BLM also used a similar methodology to forecast the total number of occupied marbled murrelet sites that could occur on BLM-administered lands irrespective of land use allocation based on the acreage of nesting habitat in 2013, the detection rates, and average size of survey polygons as described above. The forecast of the total number of marbled murrelet sites in the decision area would help to provide context for the effects of the alternatives.

The alternatives present a range of pre-project survey requirements in the management direction (see Chapter 2). The management direction for marbled murrelet surveys is summarized briefly:

- No Action alternative – survey nesting habitat
- Alternative A – no surveys required
- Alternative B – survey nesting habitat in Zone 1 (0 to 35 miles from the coast), no surveys in Zone 2 (35 to 50 miles from the coast)
- Alternative C – survey nesting habitat for projects in stands 120-years-old or older
- Alternative D – survey nesting habitat

Depending on the management direction in the alternative and arrangement of nesting habitat, each alternative would have different amounts of nesting habitat that would have surveys and nesting habitat that would not have surveys. For this analysis, the BLM assumed future marbled murrelet sites would be discovered using the detection rates described above in nesting habitat with surveys. Conversely, the BLM assumed that nesting habitat without surveys would still contain marbled murrelet sites using the detection rates described above, but that these sites would remain undiscovered and that the habitat at these sites within the Harvest Land Base would be removed by timber harvest.

Under all alternatives, the BLM would restrict activities that would disrupt nesting marbled murrelets during the nesting period. Therefore, the BLM assumed that there would not be any disruption effects to nesting marbled murrelets under any of the alternatives.

Affected Environment and Environmental Consequences

There are 321 known, occupied marbled murrelet sites on BLM-administered lands (GeoBOB, 2013), encompassing 46,642 acres, as delineated by the BLM offices (**Figure 3-182**).

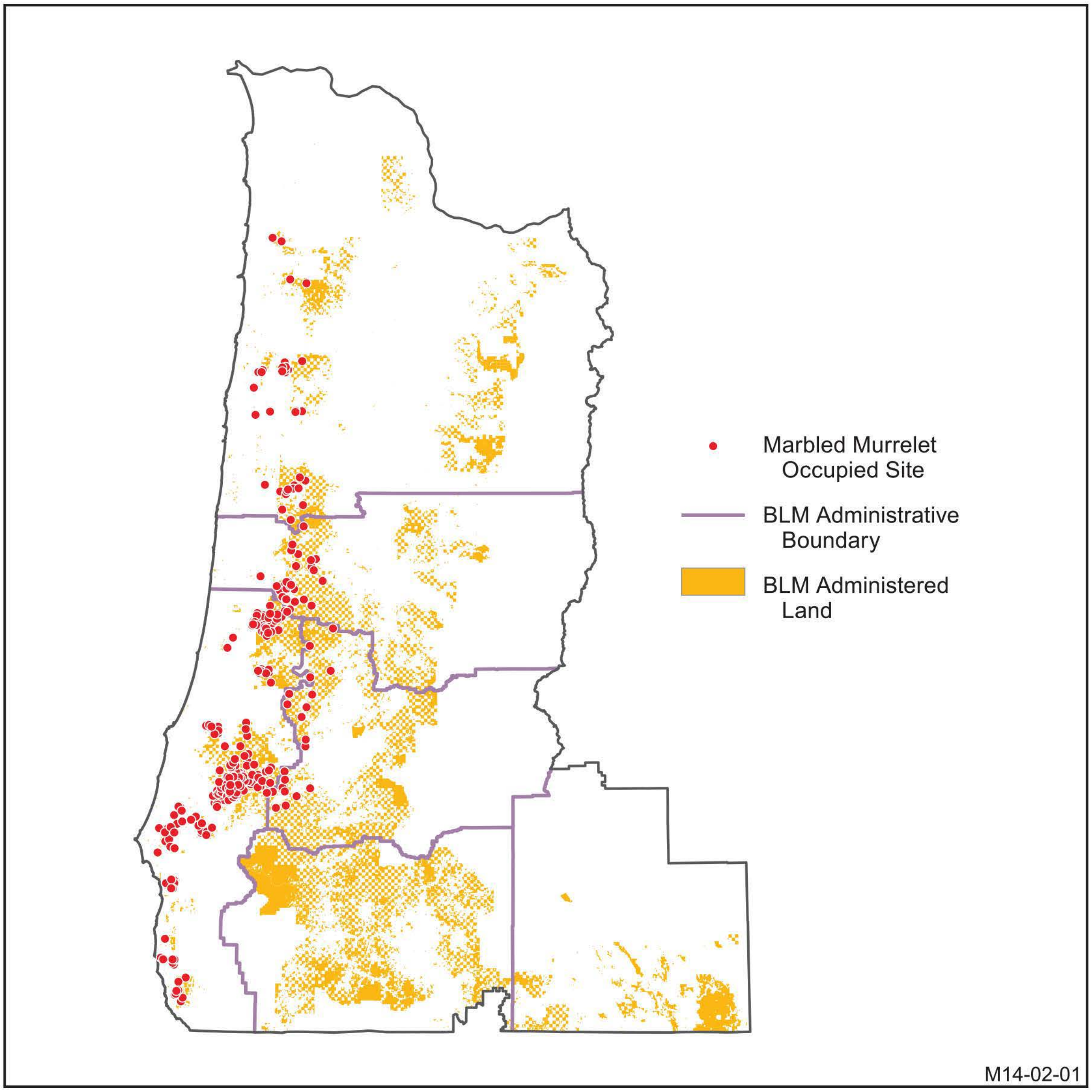

Figure 3-182. Known, occupied marbled murrelet sites.

Approximately 88 percent of total occupied site acreage in the decision area is currently nesting habitat, 9 percent is capable of developing into nesting habitat in the future, and 3 percent is non-forest. Known sites would be included within the Late-Successional Reserve under the No Action alternative and Alternatives A, B, and D; therefore, all current nesting habitat within occupied sites would be retained, and eventually 97 percent of the acreage within occupied sites would develop into nesting habitat under these alternatives.

The alternatives would have differing amounts of marbled murrelet nesting habitat that would be allocated to the Harvest Land Base. The No Action alternative would have the greatest amount of current nesting habitat in the Harvest Land Base, followed by Alternative D and C (**Table 3-256**). Alternatives A and B would have the least amount of current nesting habitat allocated to the Harvest Land Base. Under the No Action alternative and Alternative D, the BLM would survey all nesting habitat in the Harvest Land Base prior to habitat modification. Under Alternative B, the BLM would survey approximately 68 percent of the nesting habitat in the Harvest Land Base prior to habitat modification. Under Alternative C, the BLM would survey approximately 19 percent of the nesting habitat in the Harvest Land Base prior to habitat modification. Under Alternative A, the BLM would not survey nesting habitat in the Harvest Land Base prior to habitat modification.

Table 3-256. Marbled murrelet nesting habitat in the Harvest Land Base of the decision area in 2013.

Nesting Habitat Location	No Action (Acres)	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)	Alt. D (Acres)
Harvest Land Base	140,848	44,348	39,241	127,550	114,874
Decision Area	493,969	493,969	493,969	493,969	493,969
Percentage of HLB with MaMu Nesting Habitat	29%	9%	8%	26%	23%

Under the No Action alternative and Alternative D, the BLM would identify and protect all future marbled murrelet sites. Alternatives A, B, and C would result in the loss of 96, 12, and 210 future marbled murrelet sites, respectively, as a result of timber harvest in the Harvest Land Base in the absence of surveys over a 50 year period **Table 3-257.** Based on the total amount of nesting habitat in the decision area, the BLM forecasts that there would be 1,065 marbled murrelet occupied sites on BLM-administered lands. Raphael *et al.* (2002) estimated 150 hectares (370 acres) of nesting habitat could support a pair of marbled murrelets on the Olympic Peninsula.[94] Compared to the total number of occupied marbled murrelet sites forecast to occur on BLM-administered lands, Alternatives A, B, and C would result in the loss of 9 percent, 1 percent, and 20 percent of occupied sites, respectively, because of timber harvest in the Harvest Land Base in the absence of surveys.

Table 3-257. Marbled murrelet occupied site forecast in the decision area under each alternative.

Occupied Sites Forecasted Between 2013-2063	No Action (Number of Sites)	Alt. A (Number of Sites)	Alt. B (Number of Sites)	Alt. C (Number of Sites)	Alt. D (Number of Sites)
Harvest Land Base-Protected	344	-	86	45	255
Harvest Land Base-Lost	-	96	12	210	-
Not in Harvest Land Base-Protected	721	969	967	810	810
Totals	**1,065**	**1,065**	**1,065**	**1,065**	**1,065**
Forecasted Sites Lost in the HLB as a Percentage of the Total	**-**	**9%**	**1%**	**20%**	**-**

Management direction under the alternatives would provide differing amounts of protection around future occupied marbled murrelet sites. Alternative D and the No Action alternative would provide the greatest acreage of protection around an individual site; all contiguous habitat within 0.5 miles would be included in the occupied site delineation (approximately 503 acres based on a circular radius). Alternatives B and C would both protect lands within 300 feet (approximately 6.5 acres based on a circular radius) of future, occupied site delineations, but only mature or structurally-complex stands would be included in the

[94] To evaluate the accuracy of this forecast, this analysis also estimated marbled murrelet occupied sites on BLM-administered lands using a different methodology: Raphael *et al.* (2002) estimated that 150 hectares (370 acres) of nesting habitat could support a pair of marbled murrelets on the Olympic Peninsula. Applying the estimate from Raphael *et al*. (2002) to the amount of nesting habitat currently available on BLM-administered lands (493,969 acres), there would be 1,335 occupied marbled murrelet sites in the decision area, which is comparable to the estimate based on BLM survey detection rates.

delineation under Alternative C. Alternative A would provide no protection to future sites, because the BLM would have no future discoveries of occupancy in the absence of surveys.

Under Alternative C, designation and protection of an occupied site would last for 10 years after its discovery. For known, occupied sites, protection would last for 10 years after the Record of Decision for the RMP is signed (approximately 2026). Cessation of protection for occupied sites 10 years after discovery or after the Record of Decision is signed would lead to an eventual loss of occupied marbled murrelet sites. For the first decade or two, the BLM expects that most or all currently marbled murrelet sites would continue to be occupied, since murrelets tend to have high nest-site fidelity and nest locations of multiple birds can be aggregated. Miller *et al.* (2012) report that marbled murrelets re-nest in the same forest stands and trees in successive years which suggests they have high nest-site fidelity. Marbled murrelets are semi-colonial nesters, since there can be multiple, simultaneous detections of more than one bird at inland sites and nesting locations are often aggregated (57 FR 45328) although marbled murrelets are not truly colonial nesters (Raphael *et al.* in press). Mack *et al.* (2003) reported that, on average, 39 percent of occupied sites changed status over a two-year period, and site status was not independent between years. The causes of changing site status between years unknown, but variation between years could be due to changes in ocean conditions and prey base. In the long-term (beyond the first decade or two), the BLM expects that there would be fewer occupied marbled murrelet sites, and there would be fewer birds nesting in aggregated groups at occupied sites if the observed range-wide declines (3.7 percent annually (Miller *et al.* 2012) in the marbled murrelet continue. Finally, many currently occupied marbled murrelet sites would remain within the Late-Successional Reserve or other reserve land use allocations under Alternative C, even after 10 years without evidence of occupancy, because of reasons unrelated to marbled murrelets, such as location within structurally-complex forest or large block forest reserves. Because of these uncertainties related to whether current and future marbled murrelet sites would continue to be protected for longer than 10 years, the BLM did not model the loss of protection around occupied marbled murrelet sites after 10 years under Alternative C. Cessation of protection for occupied marbled murrelet sites after 10 years presents an unquantified level of uncertainty related to marbled murrelet site protection.

The loss of future occupied sites through the lack of surveys or cessation of protection on known sites would adversely affect the marbled murrelet. Alternative C would result in the greatest loss of future marbled murrelet sites from lack of surveys, and would result in an unquantified level of loss from cessation of protections on sites after 10 years. Therefore, Alternative C would have the greatest impact on marbled murrelet populations overall, through the loss of occupied sites; the BLM forecasts that 20 percent of the total occupied marbled murrelet sites would be lost under Alternative C (**Table 3-257**) Fewer sites for nesting marbled murrelets would lead to reduced nesting, reduced nest success, and ultimately to population instability or decline. Fewer occupied sites would make marbled murrelet nesting more susceptible to stochastic events in the terrestrial or marine environments. However, a quantified link between the number of occupied sites and marbled murrelet population numbers, stability, or trends is unknown. Loss of occupied sites could arrest, or possibly reverse, the observed upwards population trends in Conservation Zones 3 and 4 (0.5 percent and 1.6 percent increase per year, respectively).However, it is unknown if there is a critical threshold number of occupied sites on the landscape necessary to sustain marbled murrelet populations.

Alternative A would result in the loss of nine percent of future, occupied marbled murrelet sites (**Table 3-257**), and all existing, occupied sites would be protected. Alternative B would result in the loss of 1 percent of future occupied sites, and all existing, occupied sites would be protected. However, there is no basis on which to conclude whether the number of occupied, sites lost under Alternative A, B, or C crosses a threshold, resulting in substantial changes to the marbled murrelet population.

Under Alternative D and the No Action alternative, there would be no loss of future or existing occupied sites. Because of the protection of future and existing sites combined with the substantial habitat development, Alternative D and the No Action alternatives would have the greatest beneficial effect on marbled murrelets among the alternatives.

Appendix R contains additional information and supporting data on the marbled murrelet.

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North Oregon Coast Distinct Population Segment of the Red Tree Vole

Key Points

- All alternatives would lead to an increase in habitat for red tree voles within the North Oregon Coast DPS in 50 years.
- The loss of occupied stands under Alternatives A and C, particularly north of Highway 20, would further reduce the distribution of red tree voles in the North Oregon Coast DPS.
- Since every red tree vole site in the North Oregon Coast DPS is critical for persistence, the lack of provisions for pre-disturbance surveys and known site protection under Alternatives A and C would negatively affect the species.
- Alternatives B and D and the No Action alternative would include direction to conduct pre-disturbance surveys and known site management, which would protect red tree voles in the North Oregon Coast DPS.

Background

On October 13, 2011, the USFWS determined that the North Oregon Coast distinct population segment (DPS)[95] of the red tree vole (*Arborimus longicaudus*) warranted protection under the Endangered Species Act, but listing the species is precluded by the need to address higher priority species (76 FR 63720). The Analysis of the Management Situation for the RMPs for Western Oregon provides more information on the species range, population trend, and threats, which is incorporated here by reference (USDI BLM 2013, pp. 145-146).

Based on radio-telemetry, adult male red tree voles use a mean area of 0.86 acres and females use a mean area of 0.37 acres (USDA FS and USDI BLM 2000). The furthest observed overnight movement distance of an adult red tree vole is 249 feet..

Issue 1

What levels of habitat for the North Oregon Coast DPS of the red tree vole would be available under each alternative?

Summary of Analytical Methods

In this analysis, the BLM considered habitat for the North Oregon Coast DPS of the red tree vole to be mature and structurally-complex forests within the range of the DPS (**Figure 3-183**). The Planning Criteria provides more detailed information on analytical assumptions, methods and techniques, and geographic and temporal scales, which is incorporated here by reference (USDI BLM 2014).

[95] A distinct population segment (DPS) is a discrete population of a species and the smallest portion of a vertebrate species that can be protected under the Endangered Species Act.

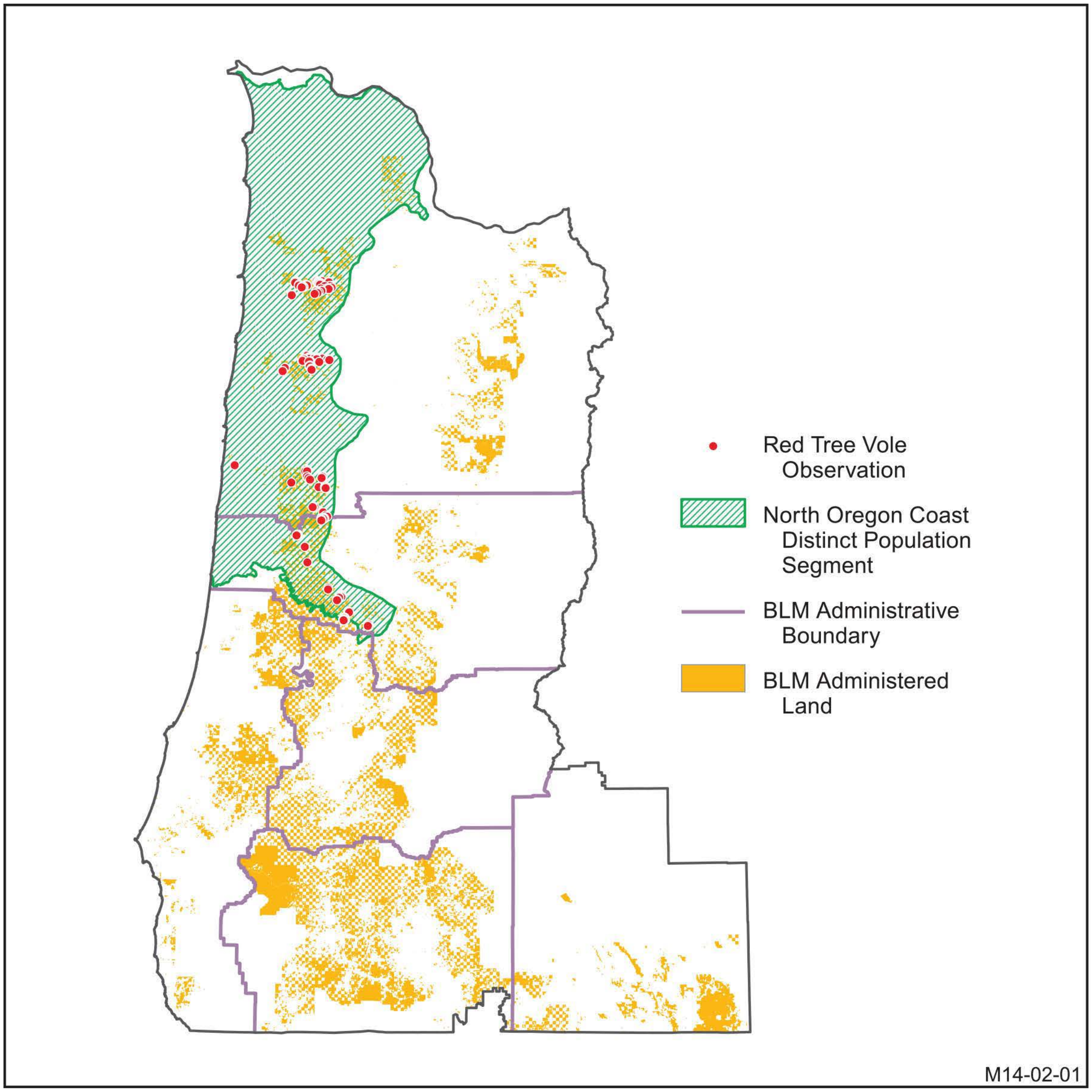

Figure 3-183. Range of the North Oregon Coast distinct population segment of the Oregon red tree vole.

This issue presents both an analysis of the direct and indirect effects of alternative implementation on habitat for the North Oregon Coast DPS of the red tree vole in the decision area and an analysis of the cumulative effects on habitat for the North Oregon Coast DPS of the red tree vole of past, present, and reasonably foreseeable future actions, including land management activities on BLM-administered lands and non-BLM-administered lands in the planning area.

The BLM assessed habitat connectivity by calculating the average patch size for contiguous habitat. The BLM considers the quality of habitat to increase as patch size increases. The BLM modeled habitat on non-BLM-administered lands within the planning area using the 2012 GNN structural condition.

The BLM forecast the number of stands within the North Oregon Coast DPS occupied by red tree voles in the future by applying observed detection rates and mean size of occupied stands against the acreage of habitat in the Harvest Land Base. In this analysis, the BLM assumed that forecast future sites within the

Harvest Land Base would be lost as a result of timber harvest in alternatives that did not require surveys prior to habitat modification and protection of sites. The BLM assumed that sites within reserve allocations would be protected under all alternatives.

Through preliminary analysis, the BLM found that surveys had a 22.9 percent detection rate (39 of 120 survey polygons) within the range of the North Oregon Coast DPS (USDI BLM, unpublished data, 2014). Within the North Oregon Coast DPS, red tree voles are more abundant south of Highway 20 (49.2 percent detection rate) than north of Highway 20 (8.3 percent detection rate). The survey polygons the BLM considered in this preliminary analysis represent 6,245 acres of survey effort. The BLM applied these detection rates to the amount of red tree vole habitat within the Harvest Land Base within the range of the North Oregon Coast DPS under each alternative.

The average size of survey polygons within the North Oregon Coast DPS is 36.7 acres (GeoBOB 2013). The BLM divided the acreage of habitat in the Harvest Land Base by 36.7 acres to forecast the number of stands that the BLM predicts to be occupied by red tree voles in the Harvest Land Base within the North Oregon Coast DPS. While this forecast uses spatial data, the BLM did not forecast the specific location of future, occupied stands. Thus, BLM did not specifically and separately analyze habitat development in or near these forecast sites.

Unlike the analysis for marbled murrelet and fisher, BLM did not calculate core and edge habitat since the available scientific literature has not established an effective “edge” distance for red tree voles.

In this analysis, the BLM did not evaluate changes in the population of red tree voles as a result of changes in habitat, because quantifiable relationships between habitat availability and numbers of individual red tree voles in populations are unavailable.

Affected Environment and Environmental Effects

There are currently 174,495 acres of habitat for the North Oregon Coast DPS of the red tree vole in the decision area (**Figure 3-184**). Of the forested lands capable of providing habitat, 53 percent is currently habitat in the decision area.

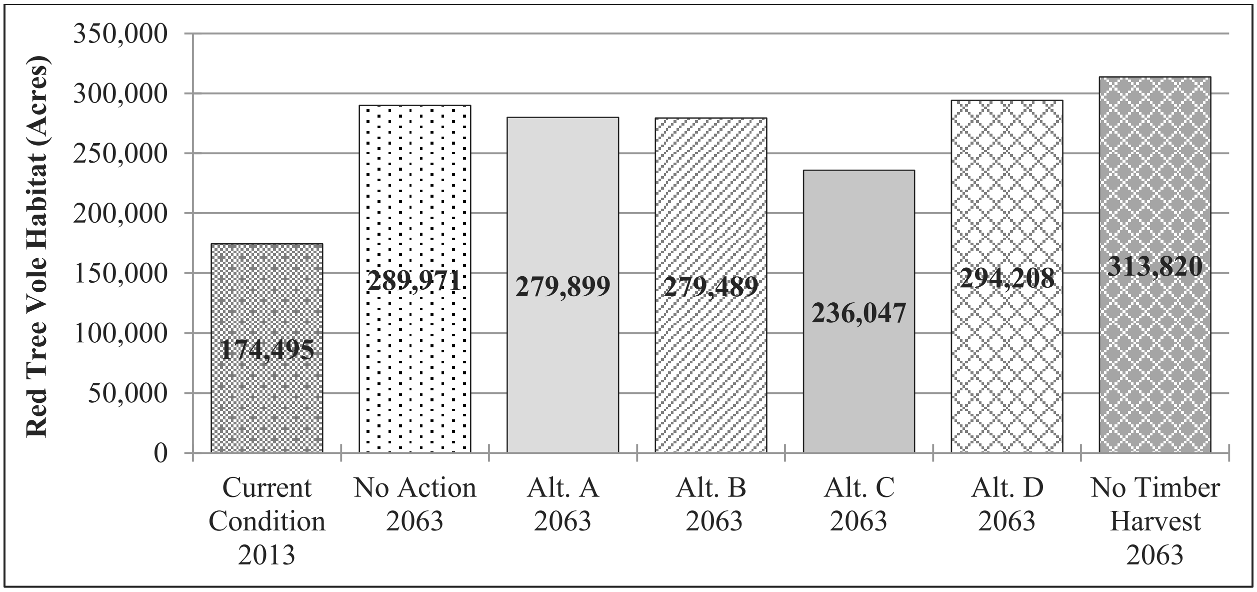

Figure 3-184. Red tree vole habitat within the North Oregon Coast DPS in the decision area.

There are currently 3,728,250 acres of habitat for the North Oregon Coast DPS of the red tree vole across all land ownerships in the planning area (**Figure 3-185**). Of the forested land capable of providing habitat, 20 percent is currently habitat within the planning area. The BLM-administered lands provide 24 percent (174,495 acres) of the available habitat for the North Oregon Coast DPS of the red tree vole.

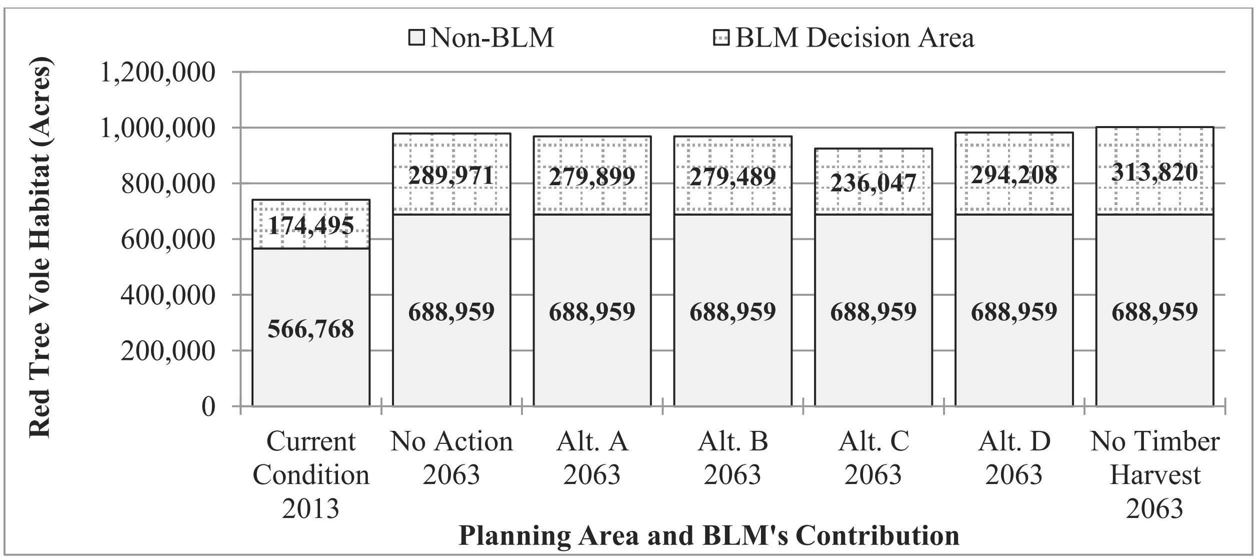

Figure 3-185. Red tree vole habitat within the North Oregon Coast DPS in the planning area.

Under the No Timber Harvest Reference Analysis, there would be 313,820 acres of habitat in the decision area in 50 years (**Figure 3-185**). Under all alternatives, habitat for red tree voles within the North Oregon Coast DPS would increase from current conditions in 50 years. The action alternatives would develop 75 to 94 percent as much habitat as under the No Timber Harvest Reference Analysis. Alternative D and the No Action alternative would develop the greatest amount of habitat among the alternatives; Alternatives A and B would develop almost as much habitat as Alternatives D and the No Action alternative. Alternative C would develop the least amount of habitat of all alternatives, substantially less than the other alternatives.

Under the Alternatives A, B, D, and the No Action alternative, the amount of red tree vole habitat within the North Oregon Coast DPS would continually increase. That is, there would be no net loss of habitat at any time period relative to current conditions. Under Alternative C, there would be a 4 percent loss (-7,339 acres) of habitat in the first decade. However, sufficient habitat would develop by the second decade to surpass current amounts (*Appendix R*)

At the planning area scale, red tree vole habitat within the North Oregon Coast DPS would increase by 25 to 33 percent under the alternatives in 50 years (**Figure 3-185**). The No Action alternative and Alternatives A, B, and D would have the similar gains in habitat (32, 31, 31, and 33 percent respectively), only slightly less than the No Timber Harvest Reference Analysis. Alternative C would have the least gain in habitat development (25 percent).

Under Alternatives A, B, D, and the No Action alternative, BLM-administered lands would contribute 29 to 30 percent of the habitat for red tree voles within the North Oregon Coast DPS in the planning area in 50 years. The BLM-administered lands would contribute 26 percent of the habitat under Alternative C (**Figure 3-185**). At the planning area scale, Alternatives A, B, D, and the No Action alternative would provide 92 to 98 percent of the habitat projected under the No Timber Harvest Reference Analysis, with Alternative C providing the least habitat development (92 percent).

Currently, the average patch size of red tree vole habitat in the North Oregon Coast DPS is 29.3 acres. In 50 years, the average patch size would decrease under Alternative C but would increase under all the other alternatives, including the No Action alternative and under the No Timber Harvest Reference Analysis. The average patch size would increase to 64.4 acres under the No Timber Harvest Reference Analysis in 50 years. Alternative C would reduce average patch size to 25.6 acres, the No Action alternative and Alternatives A, B, and D would increase patch size (42.0, 40.0, 39.2, and 47.2 acres, respectively). Alternative C would lead to additional fragmentation of red tree vole habitat, while the other alternatives would increase connectivity and suitability of habitat, based on trends in patch size. Larger patches of habitat would encourage higher local populations and higher nest numbers at a site, since the home ranges (0.37 to 0.86 acres) of multiple individuals could be contained within a single patch. Larger sites containing multiple nests would better support red tree vole population persistence in localized areas (USDI USDA 2000, p. 5).

There are 395 observations of red tree voles in the North Oregon Coast DPS within the decision area (**Table 3-258**), and an additional 14 observations on non-BLM-administered lands in the planning area (GeoBOB 2013). The small number of observations on non-BLM-administered lands is not necessarily reflective of population numbers, given the general lack of surveys outside of Federal lands within the range of the North Oregon Coast DPS. On BLM-administered lands, the currently known observations of red tree voles are biased towards pre-disturbance surveys that the BLM conducted within timber sale project areas typically located within the Harvest Land Base.

Table 3-258. Known observations (395) of red tree voles within the North Oregon Coast DPS by land use allocation.

Alternative	Observations in the Harvest Land Base[1] (%)	Observations in the Reserve Network[2] (%)
No Action	40 (10%)	355 (90%)
Alt. A	21 (5%)	374 (95%)
Alt. B	25 (6%)	370 (94%)
Alt. C	41 (10%)	354 (90%)
Alt. D	29 (7%)	366 (93%)

[1] Harvest Land Base under the No Action alternative includes: Adaptive Management Area, Connectivity/Diversity Block, and General Forest Management Area.
[2] Reserve Network includes: Adaptive Management Area Reserve, Congressional Reserve, District Defined Reserve, Late-Successional Reserve, National Monument, no harvest area, predicted marbled murrelet reserve, and Riparian Reserve.

Under the alternatives, 63 to 87 percent of BLM-administered lands within the North Oregon Coast DPS would be included in the reserve network and 13 to 37 percent of BLM-administered lands would be included in the Harvest Land Base (**Table 3-259**). **Table 3-259** provides a simplified summary of land use allocations within the North Oregon Coast DPS under the alternatives. Alternatives A and C would not require pre-disturbance surveys and protection of known sites. However, even in the absence of such management direction, red tree vole habitat and sites within the North Oregon Coast DPS that fall within the reserve system would receive protection.

Table 3-259. Land use allocations within the North Oregon Coast DPS (348,186 acres of BLM-administered lands).

Alternative	Harvest Land Base[1]		Reserve Network[2]	
	(Acres)	(%)	(Acres)	(%)
No Action	60,459	17%	287,727	83%
Alt. A	45,902	13%	302,284	87%
Alt. B	66,944	19%	281,242	81%
Alt. C	127,240	37%	220,766	63%
Alt. D	102,294	29%	245,892	71%

[1] Harvest Land Base under the No Action alternative includes: Adaptive Management Area, Connectivity/Diversity Block, and General Forest Management Area.
[2] Reserve Network includes: Adaptive Management Area Reserve, Congressional Reserve, District Defined Reserve, Late-Successional Reserve, National Monument, no harvest area, predicted marbled murrelet reserve, and Riparian Reserve.

The No Action alternative would include 83 percent of BLM-administered lands (**Table 3-259**) and 90 percent of red tree vole observations within the reserve network (**Table 3-258)**. However, there are few federally-administered lands in the North DPS (22 percent of the DPS is federally-administered, and 9 percent of the DPS is BLM-administered land). Even though a high proportion of habitat would be protected within the reserve network, land management practices on non-Federal lands reduces the potential for connectivity between the blocks of federally-managed habitat (USDA FS and USDI BLM 2004).

Alternative C would include less BLM-administered lands in the reserve network then the No Action alternative, so there would be insufficient habitat and site protection to maintain stable populations of red tree voles in the North Oregon Coast DPS without pre-disturbance surveys and site protection (**Tables 3-259** and **3-260**). However, Alternative A would include more BLM-administered lands in the reserve network than under the No Action alternative, and would thereby provide protection for habitat and known sites of red tree voles in the North Oregon Coast DPS. While the larger reserve network under

Alternative A would provide more protection for red tree voles, it is unknown if this added protection would be sufficient to maintain stable populations without pre-disturbance surveys and known site protection. Alternatives B and D and the No Action alternative would include direction to conduct pre-disturbance surveys and known site management, which would protect red tree voles in the North Oregon Coast DPS. However, given the limitations of poor connectivity among Federal habitat and low red tree vole density in the North Oregon Coast DPS, it is uncertain if even this level of protection would result in stable populations.

Table 3-260. Red tree vole habitat and forecast of occupied stands within the North Oregon Coast DPS within the Harvest Land Base.

Alternative	Habitat in the Harvest Land Base(Acres)	Occupied Stand Forecast (Number)	
	Total Habitat	Discovered and Protected	Lost
No Action	33,810	211	-
Alt. A	21,715	-	136
Alt. B	37,846	237	-
Alt. C	61,284	-	383
Alt. D	58,847	368	-

The alternatives have differing amounts of red tree vole habitat that would be allocated to the Harvest Land Base. Alternative A (21,715 acres) would have the least amount of current habitat in the Harvest Land Base (21,715 acres or 12 percent of all habitat) and Alternative C would have the greatest amount of current habitat in the Harvest Land Base (61,284 acres or 35 percent of all habitat; **Table 3-260**).

Under Alternatives B, D, and the No Action alternative, the BLM would survey habitat in the Harvest Land Base within range of the North Oregon Coast DPS prior to habitat modification and would protect red tree vole sites discovered. Under Alternatives A and C, the BLM would not require surveys prior to habitat modification, and therefore, respectively, 136 and 383 stands with forecast red tree vole occupancy would be lost (**Table 3-260**).

The protection of stands occupied by red tree voles within the North Oregon Coast DPS under the No Action alternative and Alternatives B and D would contribute to reducing the likelihood or the need for further listing under the Endangered Species Act. It is uncertain whether the loss of stands occupied by red tree voles within the North Oregon Coast DPS under Alternatives A and C would increase the likelihood or need for further listing under the Endangered Species Act because of the uncertainties around population numbers, trend, and distribution. Alternative C would result in the loss of almost three times as many occupied stands as would be lost under Alternative A. The loss of forecast occupied stands under Alternative C would be almost as great as the number of current observations of red tree voles in the North Oregon Coast DPS. The loss of occupied stands under Alternatives A and C, particularly north of Highway 20, would further reduce the distribution of red tree voles in the North Coast DPS since they are sporadically and sparsely distributed in the northern half of the DPS. Loss of sites (or occupied stands) would reduce population interaction and connectivity in the North Oregon Coast DPS. Because roughly three times more occupied stands would be lost under Alternative C than under Alternative A (**Table 3-260**), Alternative C would have a greater negative impact on the red tree voles in the North Oregon Coast DPS than Alternative A. In contrast, red tree voles in the southern portion of the DPS (south of Highway 20) are relatively more abundant, so the loss of occupied stands would not reduce the distribution of the species within this portion of its range. Because the population status or population trend of red tree voles in the North Oregon Coast DPS is unknown, it is also unknown what impact the loss of occupied stands would have on population demographics as a whole.

In summary, all alternatives would lead to an increase in habitat for red tree voles within the North Oregon Coast DPS in 50 years and the majority of that habitat would be protected within the reserve network. In addition, at least 90 percent of red tree vole observations within the North Oregon Coast DPS would be protected in the reserve network under all alternatives. The lack of provisions for pre-disturbance surveys and known site protection under Alternatives A and C would negatively affect the species. The loss of occupied stands under Alternatives A and C, particularly north of Highway 20, would further reduce the distribution of red tree voles in the North Oregon Coast DPS. Alternative C would have greater negative effect to red tree voles than Alternative A because a greater proportion of habitat would be in the Harvest Land Base from which more sites would be lost. Alternatives B and D and the No Action alternative would include direction to conduct pre-disturbance surveys and known site management, which would protect red tree voles in the North Oregon Coast DPS.

Appendix R contains additional information and supporting data on the red tree vole North Oregon Coast DPS.

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Northern Spotted Owl

Key Points

- The northern spotted owl population is under severe biological stress in much of western Oregon and has an even chance of being extirpated from the Coast Range within 35 years. This population risk is predominately due to competitive interactions between northern spotted owls and barred owls.
- In the Coast Range, the BLM has no opportunity, through habitat management, to reduce risks to the northern spotted owl during the next 50 years, and there are no substantive differences among the alternatives in their potential effects on those risks.
- However, in the western Cascades and Klamath Basin, the BLM, under all alternatives, would contribute to self-sustaining northern spotted owl populations during the next 50 years.
- The Late-Successional Reserve designs of all alternatives make similar contributions to the development and spacing of the large habitat blocks needed for northern spotted owl conservation. Once necessary lands are reserved, additional lands provide no appreciable benefit to the development or spacing of large habitat blocks.
- The alternatives differ substantively in their contributions to east-west northern spotted owl movement between the Coast Range and western Cascades.
- BLM-administered lands are indispensable:
- To northern spotted owl reproduction, movement and survival in the southern half of the Coast Range, and in western and central portions of the Klamath Basin;
- And in supporting north-south species movement through the southern portion of the Coast Range, and east-west species movement between the Coast Range and western Cascades.

Background

The U.S. Fish and Wildlife Service, in its Revised Recovery Plan for the Northern Spotted Owl (USDI FWS 2011a, pp. I-6 – I-10; hereafter referred to as the Revised Recovery Plan), and its final rule on northern spotted owl critical habitat (77 FR 71818; hereafter referred to as the final rule), described the biology and management history, and the threats to the conservation and recovery, of the northern spotted owl.

The BLM evaluated the potential effects of alternatives on the northern spotted owl according to the specific criteria developed by the U.S. Fish and Service in its Revised Recovery Plan, and used by the Service to evaluate proposed actions in accordance with the Endangered Species Act of 1973, as amended. Specifically, the BLM designed its northern spotted owl analyses to determine if, under each alternative, the BLM would—

- Contribute to a landscape in the planning area that meets the four "habitat-dependent" conservation needs of the northern spotted owl;[96] and

[96] The U.S. Fish and Wildlife Service also identifies two "habitat-independent" conservation needs in its biological opinions: a coordinated research and adaptive management effort to better understand and manage competitive interactions between spotted and barred owls, and monitoring to better understand the risk of West Nile virus and sudden oak death pose to spotted owls and, for West Nile virus, research into methods that may reduce the likelihood or severity of outbreaks in spotted owl populations. The BLM analysis did not address these conservation needs because they are habitat-independent and would be unaffected by RMP decisions.

- Manage its administered lands in the planning area in a manner that addresses the resources and processes described by Recovery Actions 6, 10, 12 and 32 of the Revised Recovery Plan (USDI FWS 2011a). RMP planning decisions could affect the implementation and accomplishment of only those four recovery actions.

Conservation Needs of the Northern Spotted Owl

In 1990 Thomas *et al.* (pp. 23-27) determined that northern spotted owl conservation required:

1. Large blocks of nesting, roosting and foraging habitat that support clusters of reproducing owls, are distributed across a variety of ecological conditions, and are spaced to facilitate owl movement between the blocks, and;

2. Habitat conditions within and surrounding large blocks of nesting, roosting and foraging habitat that facilitate owl movement between the blocks and ensure the survival of dispersing owls.

In 2004, Courtney *et al.* (Chapter 9) concluded that, although subsequent northern spotted owl research refined these conservation needs, they remained valid. In 2012, the U.S. Fish and Wildlife Service reaffirmed these conservation needs in its final rule on northern spotted owl critical habitat (77 FR 71908).

After the report by Courtney *et al.* (2004), the U.S. Fish and Wildlife Service identified two additional habitat-dependent conservation needs for the northern spotted owl:

3. A coordinated, adaptive management effort to reduce the loss of habitat due to catastrophic wildfire throughout the northern spotted owl's range, and a monitoring program to clarify whether these risk reduction methods are effective and to determine how owls use habitat treated to reduce fuels, and;

4. In areas of significant population decline, sustain the full range of survival and recovery options for this species in light of significant uncertainty.

The U.S. Fish and Wildlife Service considers all four habitat-dependent conservation needs when it evaluates proposed actions. The U.S. Fish and Wildlife Service added Conservation Needs 3 and 4 because of findings that the range-wide losses of northern spotted owl habitat to wildfire, especially in southern Oregon, posed a greater threat to northern spotted owl conservation than previously thought (Courtney *et al.* 2004, Chapter 6) and because of observed declines in the northern spotted owl population (Anthony *et al.* 2006). Conservation Need 4 has become increasingly important with continued population declines (Forsman *et al.* 2011) and recent findings on competitive interactions between northern spotted owls and barred owls (e.g., Van Lanen *et al.* 2011, Dugger *et al.* 2011, Wiens *et al.* 2014).

Recovery Actions 6, 10, 12 and 32

The U.S. Fish and Wildlife Service issued its Revised Recovery Plan in 2011. Although recovery plans are guidance documents (Stanford Environmental Law Society 2001, p. 76), they describe reasonable actions and criteria that the U.S. Fish Wildlife Service recommends for the recovery of listed species. Thus, the Revised Recovery Plan provides a useful framework for this analysis. Of the thirty-three recovery actions in the Revised Recovery Plan, only four are pertinent to the BLM RMP planning effort in that BLM planning decisions could affect the implementation and accomplishment of only those actions on BLM-administered lands in the planning area (USDI FWS 2011a):

"Recovery Action 6: In moist forests managed for spotted owl habitat, land managers should implement silvicultural techniques in plantations, overstocked stands and modified younger stands to accelerate the development of structural complexity and biological diversity that will benefit spotted owl recovery" (p. III-19).

"Recovery Action 10: Conserve spotted owl sites and high value spotted owl habitat to provide additional demographic support to the spotted owl population" (p. III-43).

"*Recovery Action 12*: In lands where management is focused on development of spotted owl habitat, post-fire silvicultural activities should concentrate on conserving and restoring habitat elements that take a long time to develop (e.g., large trees, medium and large snags, downed wood)" (p. III-49).

"Recovery Action 32: Because spotted owl recovery requires well distributed, older and more structurally-complex multi-layered conifer forests on Federal and non-Federal lands across its range, land managers should work with the Service as described below to maintain and restore such habitat while allowing for other threats, such as fire and insects, to be addressed by restoration management actions. These high-quality spotted owl habitat stands are characterized as having large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees" (p. III-67).

Summary of Analytical Methods

The BLM framed its evaluations of the four habitat-dependent conservation needs of the northern spotted owl and the implementation of Recovery Actions 6, 10, 12 and 32 as analytical questions, stated below. To complete its evaluations, the BLM created a series of northern spotted owl relative habitat suitability data surfaces (i.e., digitized geospatial datasets used in computer analyses) for all lands in the United States-portion of the northern spotted owl's range.[97] These surfaces reflect current habitat conditions and forecast habitat conditions at decadal increments for the next 50 years. The forecasts include anticipated changes to northern spotted owl habitat from forest ingrowth, forest treatment including restoration and timber harvest, and wildfire. The BLM describes the creation and validation of these surfaces in Appendix S. As explained in more detail in the sections on vegetation modeling and climate change in this chapter, the BLM did not incorporate projections of climate change into the simulation of the growth of stands through time because of the uncertainty in climate change predictions and problems in downscaling the available climate predictions for use in forest stand growth and harvesting models.

The BLM chose a 50-year analytical timeframe for its northern spotted owl analysis, mindful that the Revised Recovery Plan identifies a 30-year timeframe for the recovery of the northern spotted owl (USDI FWS 2011a, p. viii). However, the 30-year timeframe is unchanged from that of an earlier recovery plan (USDI FWS 2008) which the U.S. Fish and Wildlife Service issued before the most recent meta-analysis of northern spotted owl demography (Forsman *et al.* 2011) and recent findings on competitive interactions between northern spotted owls and barred owls (e.g., Van Lanen *et al.* 2011, Dugger *et al.* 2011, Wiens *et al.* 2014). In addition, on April 3, 2013, the assistant directors for Regions 1 and 2 of the U.S. Fish and Wildlife Service, which include the RMP planning area, issued agency guidance on implementation of the final rule on 2012 northern spotted owl critical habitat, in which they identified a conservation timeframe of at least 50 years.

[97] A small population of northern spotted owls exists in British Columbia but it would be unaffected by BLM planning decisions and its size and location would prevent it from measurably affecting the results of the BLM analyses.

These analyses differs from the analyses done by the U.S. Fish and Wildlife Service to inform its decisions on northern spotted owl recovery and northern spotted owl critical habitat (USDI FWS 2011a, Appendix C; USDI FWS 2012). These differences arise from differences in planning needs and regulatory requirements, as well as differences in data availability. The Service delineated critical habitat units, in part, assuming that existing Northwest Forest Plan land use allocations and management standards would continue, including on BLM-administered lands. In contrast, the BLM evaluated scenarios in which Northwest Forest Plan land use allocations and management standards would change on BLM-administered lands in the planning area. The Service and BLM also relied on different relative habitat suitability surfaces and different processes to evaluate the effects of habitat change.[98] Prior to deciding on its analytical methods, the BLM reviewed with the Service and other subject matter experts the methods developed by the Service. In response to this review, the BLM incorporated or augmented those datasets and methods that met its planning needs (*Appendix S*).

Issue 1

In accordance with Conservation Need 1, would the alternatives contribute to a landscape in the planning area that creates large blocks of nesting, roosting and foraging habitat that are capable of supporting clusters of reproducing owls, distributed across a variety of ecological conditions and spaced to facilitate owl movement between the blocks?

Summary of Analytical Methods

To meet Conservation Need 1, BLM-administered lands would contribute to "large blocks of habitat," each capable of supporting at least 25 northern spotted owl nesting pairs, in the Oregon Western Cascades, Oregon Eastern Cascades, Oregon Coast Range and Oregon Klamath physiographic provinces during each of the next five decades and, within 30 to 50 years, to a network of large habitat blocks that are spaced no more than 12 miles (19.3 km) apart. Where large blocks do not form within 30 to 50 years, BLM-administered lands would contribute to a network of "small blocks of habitat," each capable of supporting 1 to 24 northern spotted owl nesting pairs, that are spaced no more than 7 miles (11.3 km) from large habitat blocks or from other small habitat blocks. Because this conservation need is not specific to BLM-administered lands, the BLM evaluated Conservation Need 1 by forecasting habitat development on all lands in the planning area during the next 50 years.

Thomas *et al.* (1990, p. 164) described northern spotted owl "nesting, roosting and foraging habitat" as "multi-layered, multispecies canopy dominated by large (greater than 30 inches diameter at breast height) conifer overstory trees, and an understory of shade-tolerant conifers or hardwoods; a moderate to high (60 to 80 percent) canopy closure; substantial decadence in the form of large, live conifer trees with deformities, such as cavities, broken tops, and dwarf mistletoe infections; numerous large snags; ground cover characterized by large accumulations of logs and other woody debris; and a canopy that is open enough to allow owls to fly within and beneath it." Their description, in light of subsequent research, remains valid (Courtney *et al.* 2004, Chapter 5; USDI FWS 2011a, pp. G-2 and G-3).[99]

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[98] The U.S. Fish and Wildlife Service evaluated northern spotted owl responses to "pessimistic" and "optimistic" habitat change scenarios, neither of which was intended to predict future habitat conditions. The BLM instead chose to simulate northern spotted owl responses to forecasts of habitat change over time, on all land ownerships, from forest ingrowth, treatment and wildfire.

[99] Studies in the California Klamath and Coast Range provinces (e.g., Dugger *et al*. 2005) found that habitat comprised of a mixture of older and younger forests supported northern spotted owl reproduction better than habitat

Thomas *et al.* (1990, p. 24) described a "large block" of nesting, roosting and foraging habitat as being capable of supporting 15 to 20 northern spotted owl nesting pairs which they estimated was the minimum number for a local, reproductively-stable population. Lamberson *et al.* (1994), based on modeling, estimated that large blocks capable of supporting 20 to 25 owl pairs would have the highest efficiency of use by northern spotted owls (i.e., number of northern spotted owl pairs to block size ratio). Although "efficiency of use" is not a measure of population stability, the BLM considered their findings relevant to its evaluation of block size in light of recent information on competitive interactions between northern spotted owls and barred owls. Marcot *et al.* (2013, p. 196), also based on modeling, determined that "Long-term occupancy rates of habitats are significantly higher in scenarios with habitat clusters supporting at least 25 NSO [northern spotted owl] pairs." Marcot *et al.* did not model clusters of 15 to 20 northern spotted owl pairs; the next largest cluster size they modeled was 9 pairs. Nonetheless, part of the BLM Purpose and Need for the RMP revisions is to contribute to the conservation and recovery of the northern spotted owl, which requires more than self-sustaining populations. Therefore, the BLM defined a "cluster of reproducing owls" as at least 25 northern spotted owl nesting pairs, and a "large block" as the amount and spatial arrangement of nesting-roosting habitat capable of supporting at least 25 pairs. Consequently, a "small block" of habitat is capable of supporting 1 to 24 northern spotted owl nesting pairs.

Thomas *et al.* (1990, p. 318) considered large blocks of nesting, roosting and foraging habitat to be "distributed across a variety of ecological conditions" when they occurred in all ecological gradients of the northern spotted owl's range (i.e., in all environmental regions of a landscape). The Northwest Forest Plan (USDA FS and USDI BLM 1994, p. A-3, with map), based on findings by the Forest Ecosystem Management and Assessment Team (FEMAT 1993), defined the ecological gradients within the northern spotted owl's range by the boundaries of physiographic provinces which differentiated "areas of common biological and physical processes." The BLM analysis of Conservation Need 1 used the same physiographic provinces in the planning area to express ecological condition, in part, because Thomas *et al.* (1990, p. 194) calculated median home range sizes for the northern spotted owl, described below, for those provinces. The physiographic provinces in the planning area are the Oregon Western Cascades, Oregon Eastern Cascades,[100] Oregon Coast Range and Oregon Klamath provinces. The Willamette Valley Physiographic Province also occurs in the BLM planning area but does not support habitat for analytically meaningful numbers of northern spotted owls.

Finally, Thomas *et al.* (1990, p. 28) defined "spaced to facilitate owl movement between the blocks" as large blocks separated by no more than 12 miles (19.3 km) and small blocks separated by no more than 7 miles (11.3 km). Marcot *et al.* (2012, pp. 196-200), based on modeling, determined that habitat blocks with similar spacings had significantly higher northern spotted owl occupancy rates than blocks with larger spacings.

The BLM qualified its criteria for meeting Conservation Need 1, based on previous modeling (USDI BLM 2008a[2], pp. 4-646–4-655; No Timber Harvest Reference Analysis), according to the limited quantities and distributions of BLM-administered lands in some portions of the planning area—most notably in the northern half of the Oregon Coast Range Province—which might preclude the BLM from

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comprised almost exclusively of older forests. However, other studies have not supported that conclusion. Given the checkerboard land ownership pattern of BLM-administered lands in much of the planning area, the BLM did not consider excessive homogeneity of older forests to be a management issue.

[100] Only a portion of the Oregon Eastern Cascades Physiographic Province occurs in the planning area.

contributing to properly-spaced habitat blocks everywhere in the planning area. The BLM identified such areas by completing a No Timber Harvest Reference Analysis which forecasted potential habitat changes on (1) BLM-administered lands in the planning area from forest ingrowth and wildfire but in the absence of forest treatment (i.e., no forest restoration or timber harvest), and (2) all other lands in the range of the northern spotted owl from forest ingrowth, timber harvest and wildfire.

To address Conservation Need 1, the BLM identified areas in the planning area with the quantity and spatial arrangement of habitat sufficient to support at least one northern spotted owl nesting pair. As explained below, "spatial arrangement" is a function of the median annual home range of the northern spotted owl, which varies by physiographic province, and the minimum amount of habitat that must occur within both the median annual home range area and the 500-acre (200-ha) core use area surrounding a potential nest site. Table 1 shows these values. The BLM based the size of the median annual home range in each physiographic province on Thomas *et al.* (1990, p. 194). Because Conservation Need 1 addresses reproducing northern spotted owls, and foraging habitat commonly does not support nesting (USDI FWS 2011a, p. G-2), the BLM analyses relied on nesting-roosting habitat.

Thomas *et al.* (1990, p. 194) first tabulated median annual home ranges of northern spotted owl pairs in different study areas and physiographic provinces. According to Courtney *et al.* (2004, p. 5-5), although the sizes of northern spotted owl home ranges differ by physiographic province and forest type, and among individual owl pairs within a study area, research since 1990 has shown that provincial variations are similar to those tabulated by Thomas *et al.* (1990, p. 194). However, neither Thomas *et al.* (1990) nor Courtney *et al.* (2004, pp. 5-24) estimated the median annual home range size in the Oregon Eastern Cascades Physiographic Province. Therefore, the BLM applied the Oregon Western Cascades metrics in **Table 3-261** (and **Table 3-262**, below) to the Oregon Eastern Cascades due to their proximity and because Davis *et al.* (2011, pp. 34-35), for their analyses of northern spotted owl habitat, merged the two provinces due to their ecological similarities.

Table 3-261. Metrics to identify blocks of northern spotted owl nesting-roosting habitat.

Physiographic Province	Median Annual Home Range (Acres)	Radius of a Circle Equal in Size to the Median Annual Home Range (Miles)	Calculated Minimum Quantity of Nesting-Roosting Habitat Within a Median Annual Home Range (Acres)	Calculated Minimum Quantity of Nesting-Roosting Habitat Within a 500-acre Core Area (Acres)
Oregon Western Cascades	2,900	1.2	1,450	250
Oregon Coast Range	4,520	1.5	2,260	250
Oregon Klamath	3,400	1.3	1,700	250

The "calculated minimum quantity of nesting-roosting habitat within a median annual home range" for each physiographic province, shown in **Table 3-261**, is based on Courtney *et al.* (2004, Chapter 5, Table 5-1), Olson *et al.* (2004, pp. 1048-1052), and Dugger *et al.* (2005, pp. 873-875). It is a multiple of the median annual home range area and the minimum quantity of nesting-roosting habitat (50 percent) that should occur in that area to support owl survival and reproduction. The quantity of nesting-roosting habitat is not the best predictor of owl reproduction and survival, and the observed quantities of nesting-roosting habitat within occupied owl home ranges vary by region and by study. Nevertheless, based on expert advice (Thrailkill 2005; Jim Thrailkill, U.S. Fish and Wildlife Service, personal communication to Eric Greenquist, 2005; and Robert Anthony and Eric Forsman, both with the Oregon Cooperative Wildlife Research Unit, Oregon State University, and Joe Lint, BLM, personal communication to Eric Greenquist, 2007; also see USDI BLM 2008a[1], p. 3-288), the BLM considered a northern spotted owl territory to be unstable when less than 40 to 50 percent of the land within the home range supported nesting-roosting habitat.

Bingham and Noon (1997, pp. 133-138) defined the core use area as that portion of a northern spotted owl home range that receives disproportionately high use by owls for nesting, roosting and access to prey; they suggested that 60 to 70 percent of owl activity during the breeding season occurs in about 20 percent of the home range. Even though observed core area sizes vary among northern spotted owls (Courtney *et al.* 2004, p. 5-5), Jim Thrailkill (2005; and personal communication to Eric Greenquist, BLM, 2005) determined that Bingham and Noon (1997), Wagner and Anthony (1999), Franklin *et al.* (2000) and Irwin *et al.* (2004) collectively suggested a core area of 500 acres (200 ha). Meyer *et al.* (1998, pp. 24-25) and Zabel *et al.* (2003, pp. 1032-1037) found that their best fitting models for predicting owl occupancy also were at the 500-acre scale. Based on several studies (*e.g*., Bart 1995, Franklin *et al.* 2000, Zabel *et al.* 2003, and Dugger *et al.* 2005) and expert advice (Robert Anthony, Eric Forsman and Joe Lint personal communication to Eric Greenquist, 2007; also see USDI BLM 2008a[1], pp. 3-288–3-289), the BLM determined that 250 acres (50 percent of a 500-acre core use area) of nesting-roosting habitat within a 500-acre circle was needed for a functional core use area.

This issue presents an analysis of the cumulative effects on large blocks of northern spotted owl habitat of past, present, and reasonably foreseeable future actions, including both land management on BLM-administered lands and non-BLM-administered lands in the planning area.

Because Conservation Need 1 is not specific to BLM-administered lands, the BLM analysis mapped blocks of nesting-roosting habitat on all land ownerships in the planning area (and 10 km into Washington and California). To do this the BLM analysis "moved" a 500-acre (200-ha; core use area-size) circle over the planning area, centering it in turn on each 30 × 30-m pixel, and calculated the acres of nesting-roosting habitat on all lands in that circle. For those 500-acre circles that supported at least 250 acres of nesting-roosting habitat, the BLM analysis calculated the acres of nesting-roosting habitat within the associated provincial median annual home range circle.[101] Where the amount of nesting-roosting habitat within the median annual home range circle also met or exceeded the "calculated minimum quantity of nesting-roosting habitat within a median annual home range" shown in **Table 3-261**, the BLM analysis defined all lands in that median annual home range circle as a block of nesting-roosting habitat. The BLM considered such a block to have both the quantity and spatial arrangement of nesting-roosting habitat capable of supporting a pair of reproducing northern spotted owls, regardless of observed owl occupancy.

In this manner, the BLM analysis evaluated the areas around all 30 × 30-m pixels, on all land ownerships in the planning area. Where blocks of nesting-roosting habitat overlapped, the BLM analysis aggregated those blocks into a single block of nesting-roosting habitat. The BLM aggregated habitat blocks in this manner because, when their potential nest locations are separated by more than the diameter of the median annual home range circle, northern spotted owl pairs are less able to support each other demographically (i.e., their dispersing young are less likely to encounter each other), which is required for an owl cluster.

As described above, a "large block" is capable of supporting at least 25 pairs of northern spotted owls. The BLM determined the minimum size of a large block using a formula adapted from Thomas *et al.* (1990, p. 198, 25 owl pairs × the median annual pair home range size × 0.75). The function 0.75 accounts

[101] **Table 3-261** shows the province-specific radii of such circles. For home range circles that fell in more than one province, this analysis used the province-specific metrics appropriate for the center pixel.

for the estimated 25 percent overlap of northern spotted owl home ranges (Thomas *et al*. 1990, p. 320). This formula generated the minimum area of a large block of nesting-roosting habitat for each province, shown in **Table 3-262**.

Table 3-262. Metrics to identify and map large blocks of northern spotted owl nesting-roosting habitat.

Physiographic Province	Median Annual Home Range (Acres)	Minimum Area of a Large Habitat Block (Acres)
Oregon Western Cascades	2,900	54,375
Oregon Coast Range	4,520	84,750
Oregon Klamath	3,400	63,750

If the area of a habitat block equaled or exceeded the "minimum area of a large habitat block" shown in **Table 3-262**, the BLM analysis defined that block as a large block of nesting-roosting habitat. The BLM classified the remaining blocks as small blocks of nesting-roosting habitat. Finally, the BLM analysis delineated the area around each block: 6 miles (9.7 km) from the boundaries of large blocks and 3.5 miles (5.6 km) from the boundaries of small blocks.

The products were maps of the planning area showing large and small habitat blocks on all land ownerships at decadal increments, each surrounded by delineations to help visually determine if large blocks would be within 12 miles (19.3 km) of other large blocks and small blocks would be within 7 miles (11.3 km) of large or other small blocks. Since the underlying relative habitat suitability surfaces varied by alternative and decade over 50 years, the resulting maps and their habitat block configurations also varied by alternative and decade.

Affected Environment and Environmental Effects

Figure 3-186 shows the current locations of large and small habitat blocks in the planning area, and areas within 6 miles of large blocks and within 3.5 miles of small blocks. Currently, large habitat blocks, each capable of supporting a cluster of reproducing northern spotted owls (i.e., at least 25 owl pairs), are distributed across the variety of ecological conditions (i.e., in all physiographic provinces). In addition, the large blocks are spaced to facilitate northern spotted owl movement between and through the large blocks in and between the Oregon Western Cascades, Oregon Eastern Cascades and Oregon Klamath provinces, and between those provinces and the southern half of the Oregon Coast Range Province. However, the northern half of the Oregon Coast Range Province currently supports one large habitat block, which is not spaced properly with any other large habitat block. In addition, the small habitat blocks in this area, when added to the single large habitat block, are insufficient to meet Conservation Need 1.

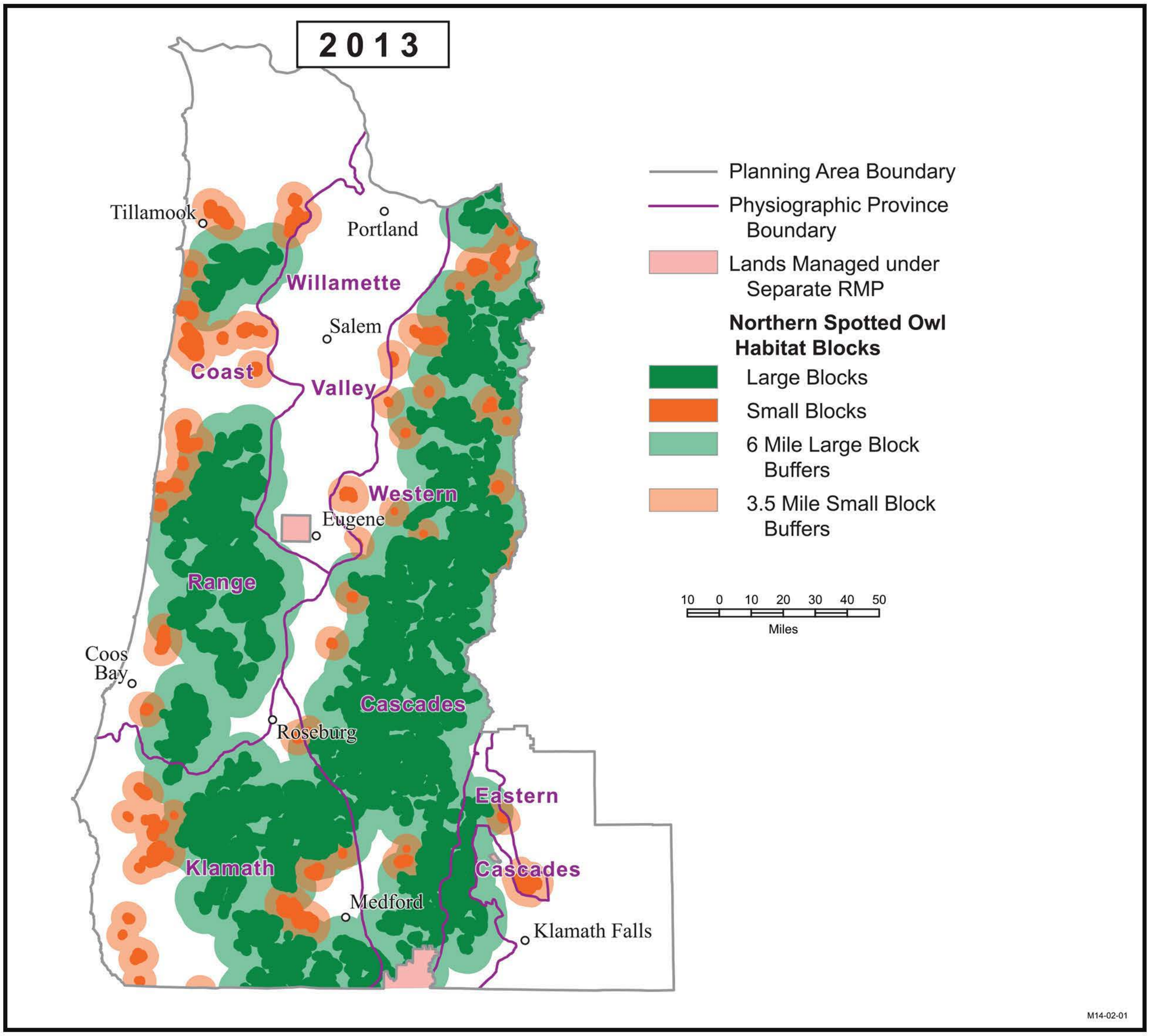


Figure 3-186. The current positions of northern spotted owl habitat blocks in western Oregon.

Dark green blocks are capable of supporting ≥ 25 pairs; dark yellow blocks are capable of supporting 1-24 pairs. Light green denotes areas within 6 miles of dark green blocks; light yellow denotes areas within 3.5 miles of dark yellow blocks.

Figure 3-187 shows the capability of the forested landscape managed by the BLM in the planning area to contribute to habitat block development in 30 years (2043) and 50 years (2063) according to the No Timber Harvest Reference Analysis. As evidenced by this figure, the forested landscape managed by the BLM is capable of continuing to contribute to a western Oregon landscape that meets Conservation Need 1 in both 30- and 50-year timeframes, except in the northern half of the Oregon Coast Range Province.

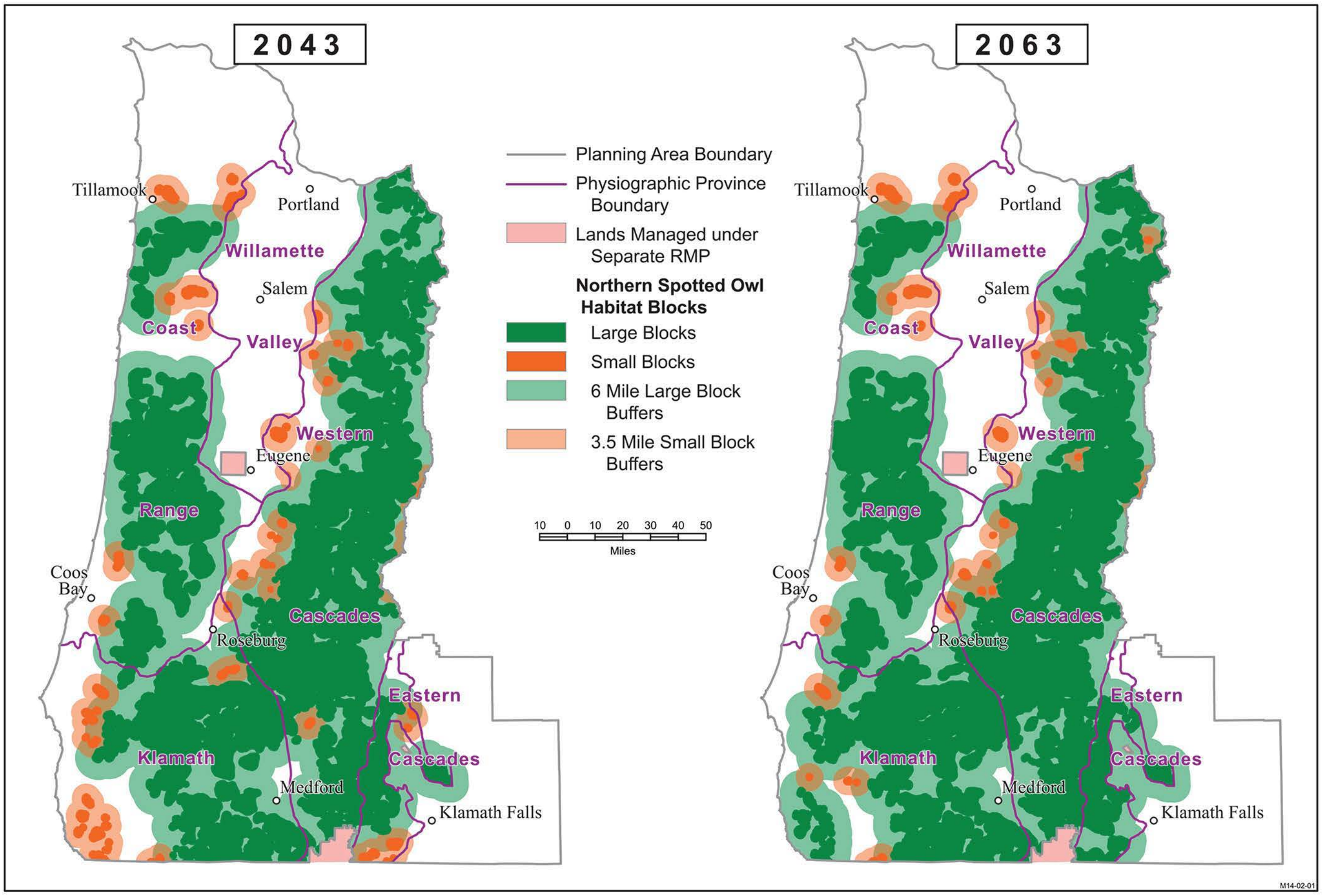
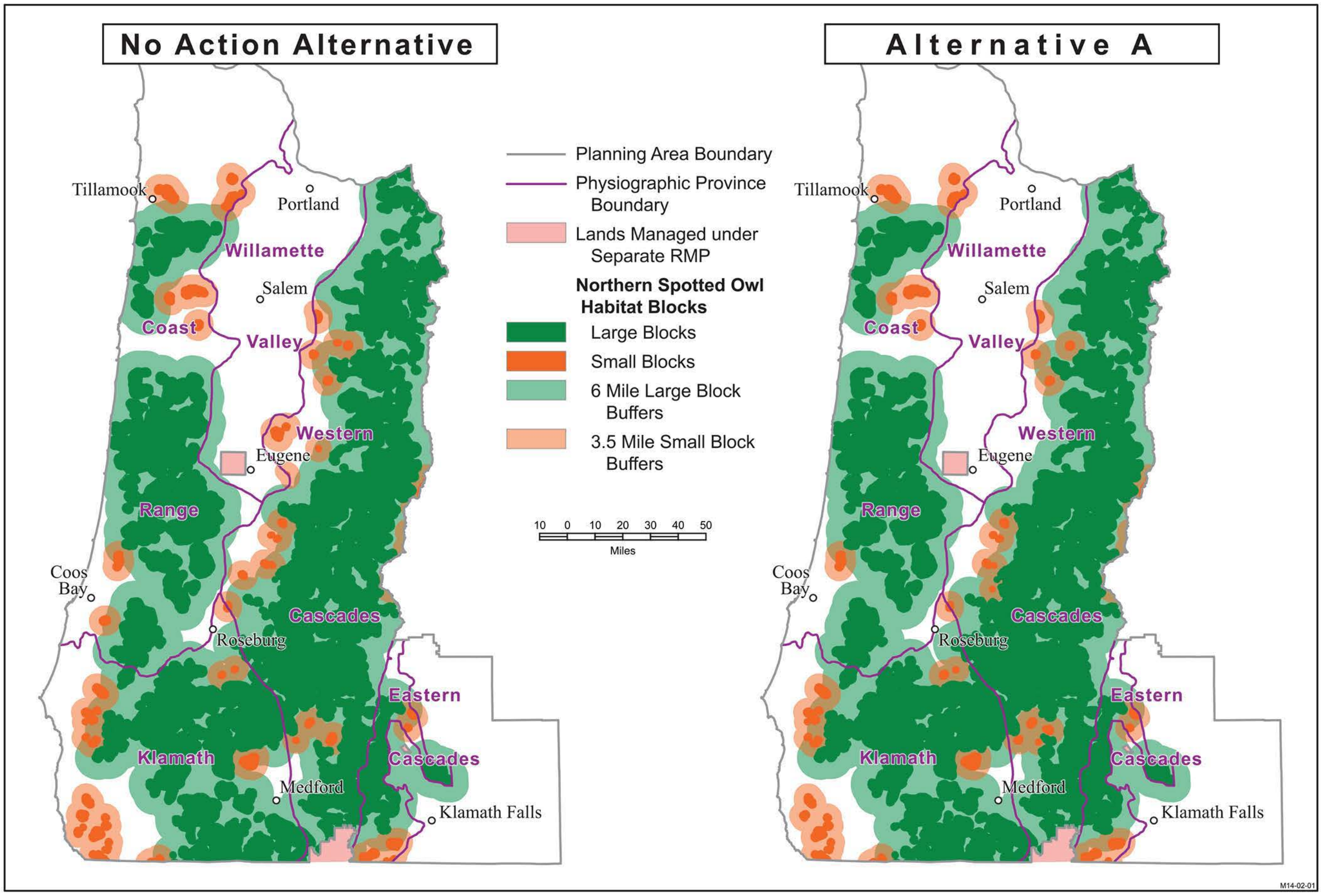
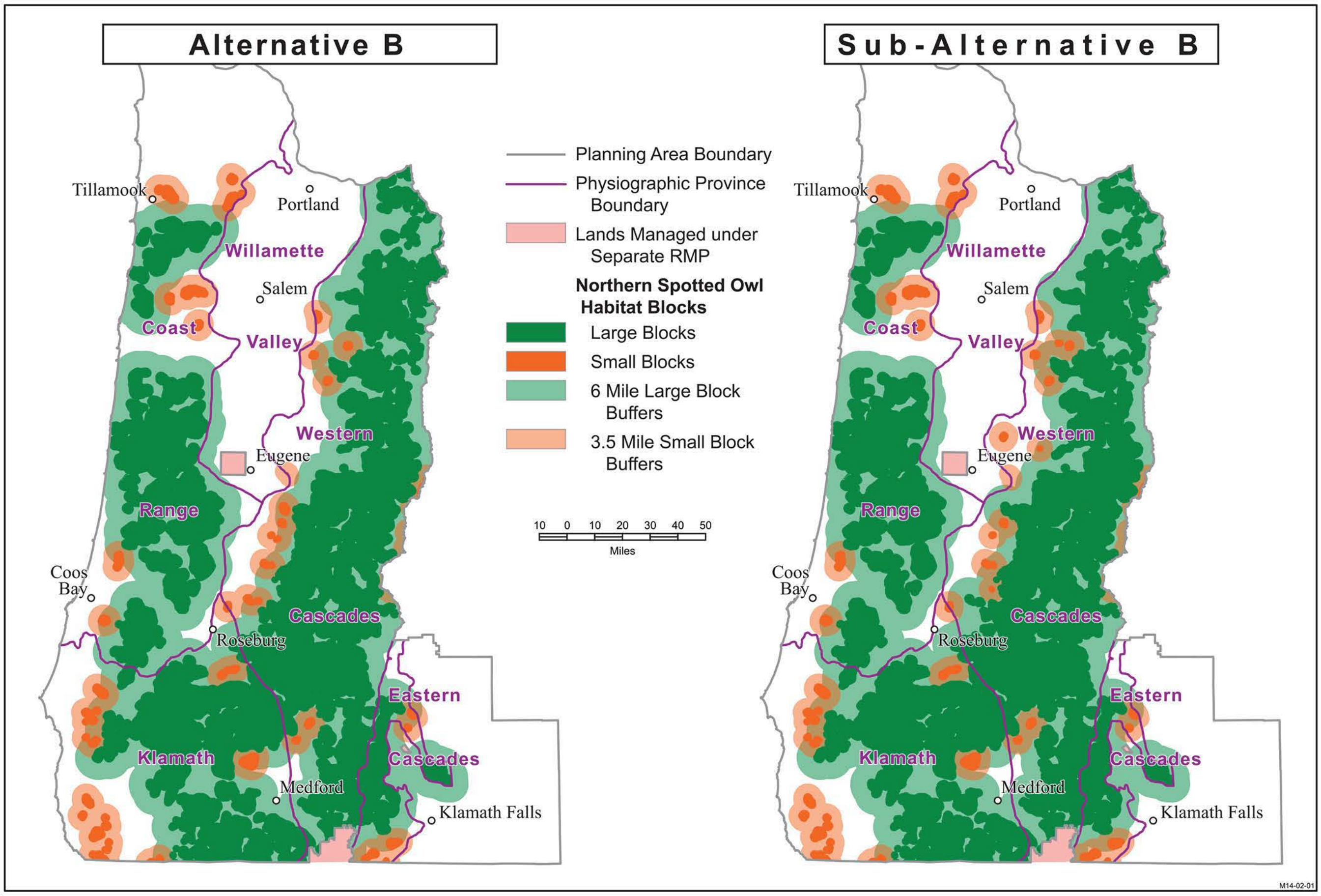


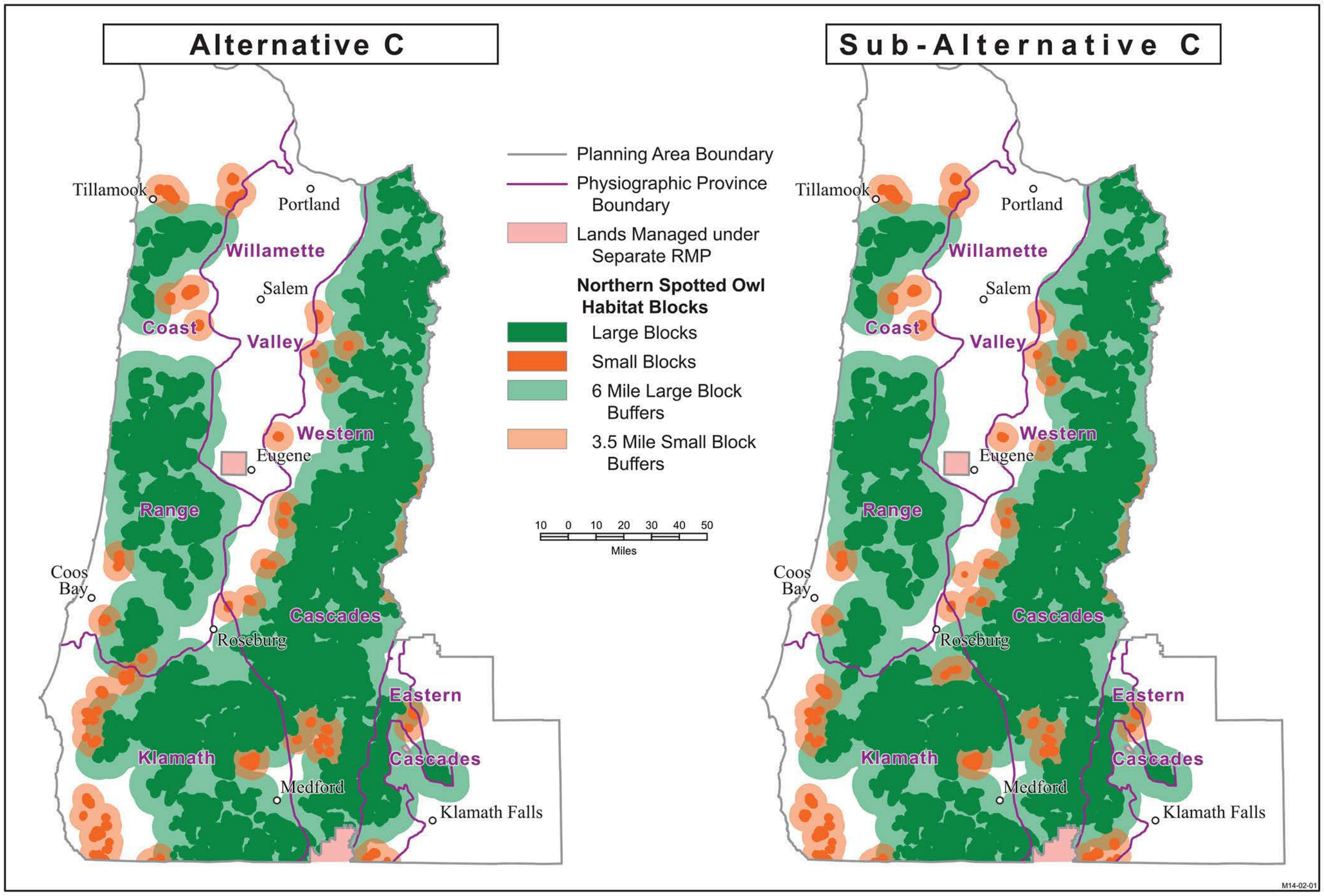
Figure 3-187. The potential contributions of BLM-administered lands in western Oregon to habitat blocks in 2043 and 2063 according to the No Timber Harvest Reference Analysis.

Figures 3-188 and **3-189** show the locations of northern spotted owl habitat blocks in, respectively, 30 years (2043) and 50 years (2063), under the No Action alternative and each of the action alternatives. During the next 50 years, under each alternative, the BLM would contribute to a landscape that supports large blocks of nesting, roosting and foraging habitat in accordance with Conservation Need 1, with the exception of the northern half of the Oregon Coast Range Province in which the BLM has no opportunity to contribute to properly spaced large habitat blocks.



No Action Alternative
Alternative A
Planning Area Boundary
Physiographic Province Boundary
Lands Managed under Separate RMP
Northern Spotted Owl Habitat Blocks
Large Blocks
Small Blocks
6 Mile Large Block Buffers
3.5 Mile Small Block Buffers
10 0 10 20 30 40 50
Miles
Tillamook
Portland
Salem
Eugene
Coos Bay
Roseburg
Medford
Klamath Falls
Willamette Valley
Coast Range
Western Cascades
Klamath
Eastern Cascades
M14-02-01


Alternative B
Sub-Alternative B
Planning Area Boundary
Physiographic Province Boundary
Lands Managed under Separate RMP
Northern Spotted Owl Habitat Blocks
Large Blocks
Small Blocks
6 Mile Large Block Buffers
3.5 Mile Small Block Buffers
10 0 10 20 30 40 50
Miles
Tillamook
Portland
Salem
Eugene
Coos Bay
Roseburg
Medford
Klamath Falls
Willamette
Valley
Coast
Range
Western
Cascades
Eastern
Cascades
Klamath
M14-02-01


Alternative C
Sub-Alternative C
Planning Area Boundary
Physiographic Province Boundary
Lands Managed under Separate RMP
Northern Spotted Owl Habitat Blocks
Large Blocks
Small Blocks
6 Mile Large Block Buffers
3.5 Mile Small Block Buffers
10 0 10 20 30 40 50
Miles
Tillamook
Portland
Salem
Eugene
Coos Bay
Roseburg
Medford
Klamath Falls
Willamette Valley
Coast Range
Western Cascades
Klamath
Eastern Cascades
M14-02-01

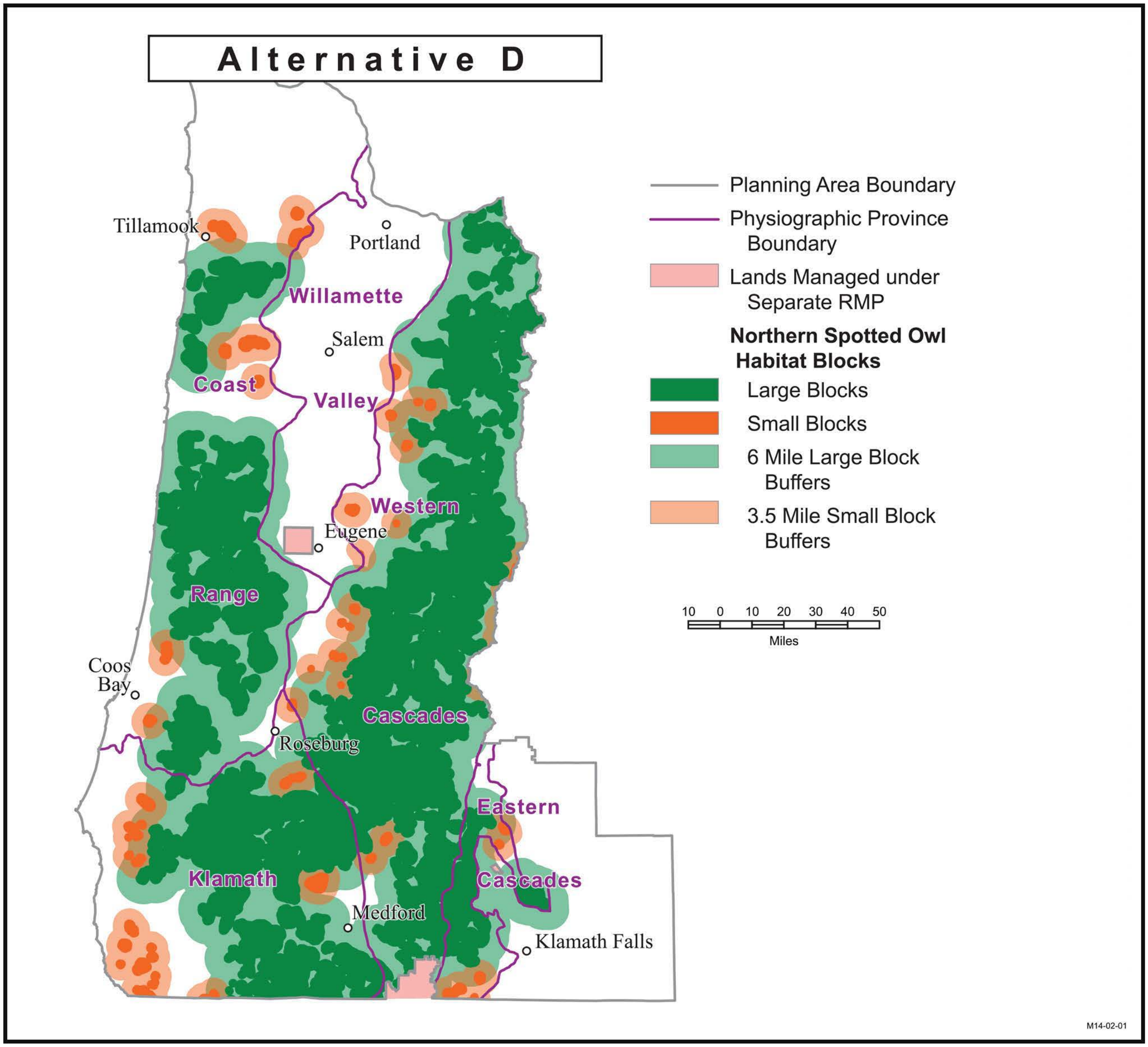
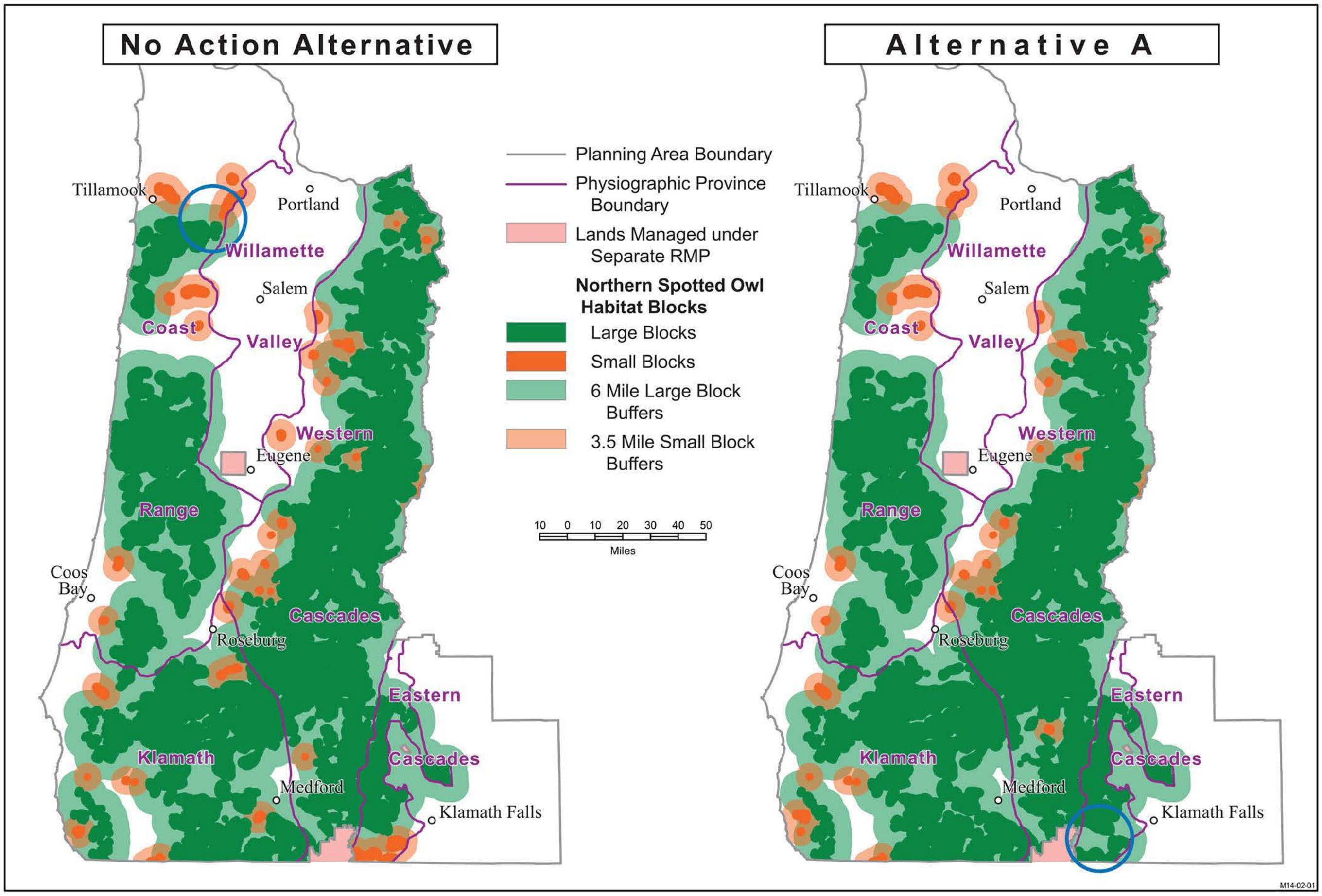


Figure 3-188. Northern spotted owl habitat block locations in 2043 under the No Action alternative and each of the action alternatives.



No Action Alternative
Alternative A
Planning Area Boundary
Physiographic Province Boundary
Lands Managed under Separate RMP
Northern Spotted Owl Habitat Blocks
Large Blocks
Small Blocks
6 Mile Large Block Buffers
3.5 Mile Small Block Buffers
10 0 10 20 30 40 50
Miles
Tillamook
Portland
Willamette
Salem
Coast
Valley
Western
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Coos Bay
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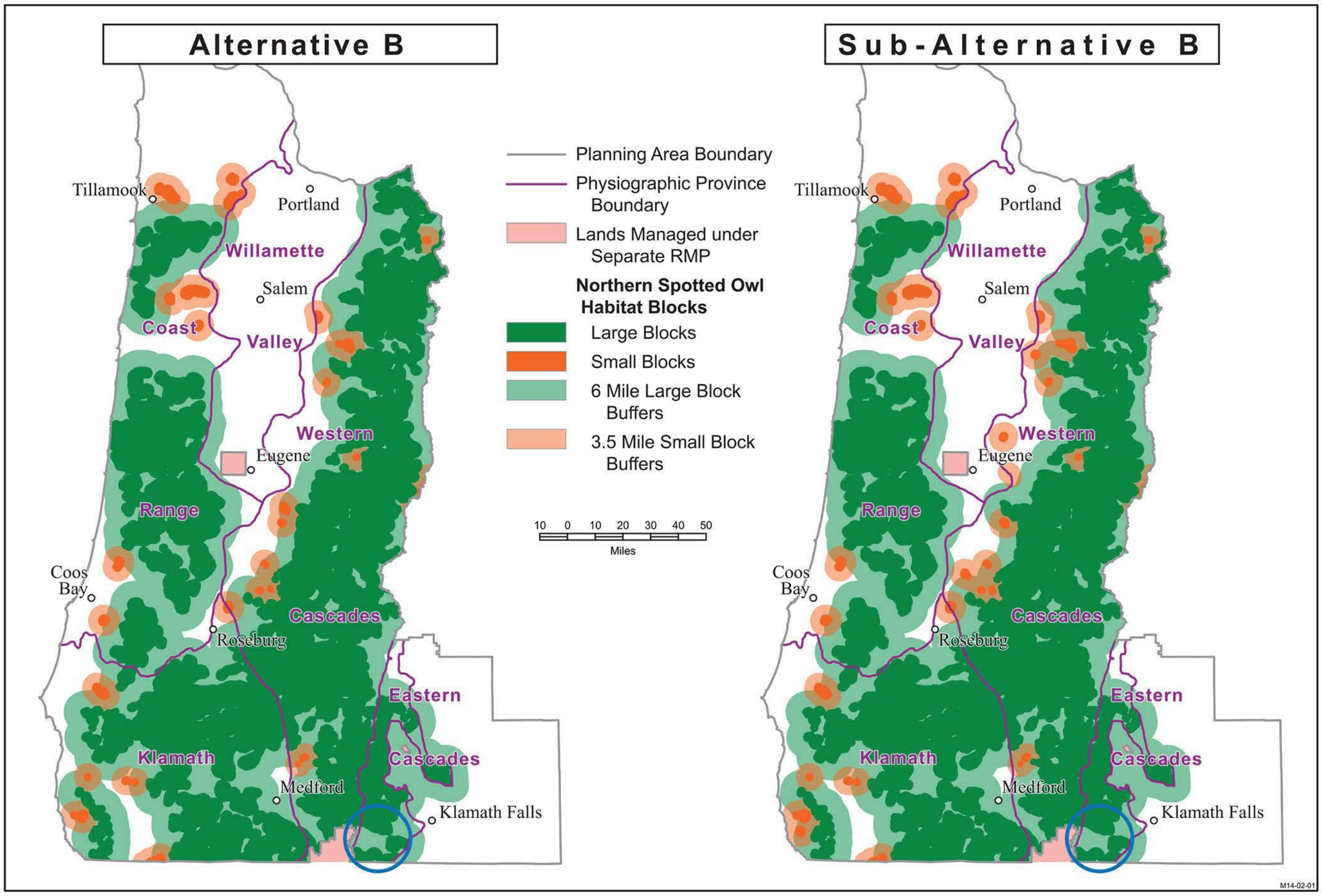
Klamath Falls
M14-02-01


Alternative B
Sub-Alternative B
Planning Area Boundary
Physiographic Province Boundary
Lands Managed under Separate RMP
Northern Spotted Owl Habitat Blocks
Large Blocks
Small Blocks
6 Mile Large Block Buffers
3.5 Mile Small Block Buffers
10 0 10 20 30 40 50
Miles
Tillamook
Portland
Salem
Eugene
Coos Bay
Roseburg
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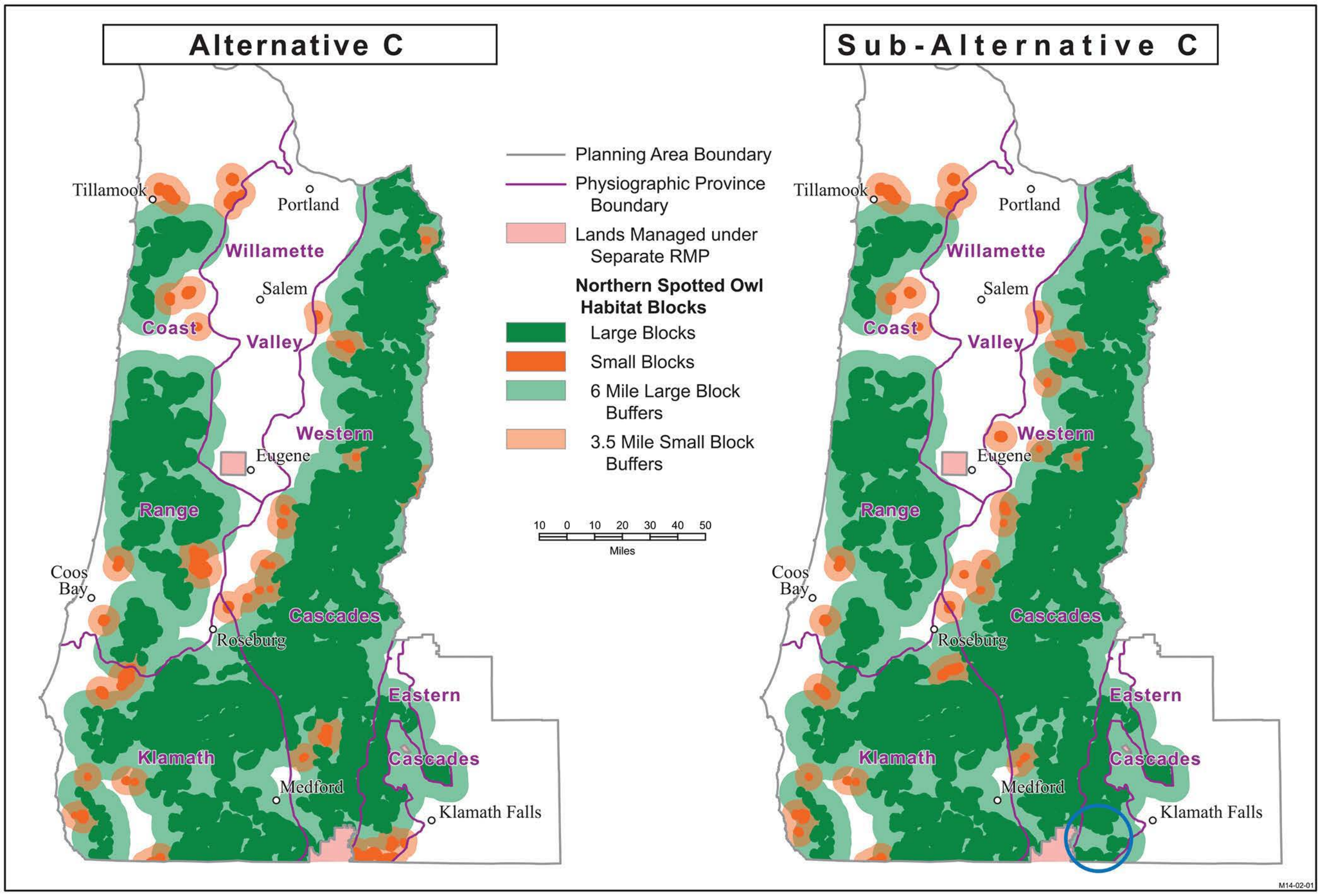
Western Cascades
Eastern Cascades
Klamath
M14-02-01


Alternative C
Sub-Alternative C
Planning Area Boundary
Physiographic Province Boundary
Lands Managed under Separate RMP
Northern Spotted Owl Habitat Blocks
Large Blocks
Small Blocks
6 Mile Large Block Buffers
3.5 Mile Small Block Buffers
10 0 10 20 30 40 50
Miles
Tillamook
Portland
Salem
Eugene
Coos Bay
Roseburg
Medford
Klamath Falls
Willamette
Valley
Coast
Range
Western
Cascades
Eastern
Cascades
Klamath

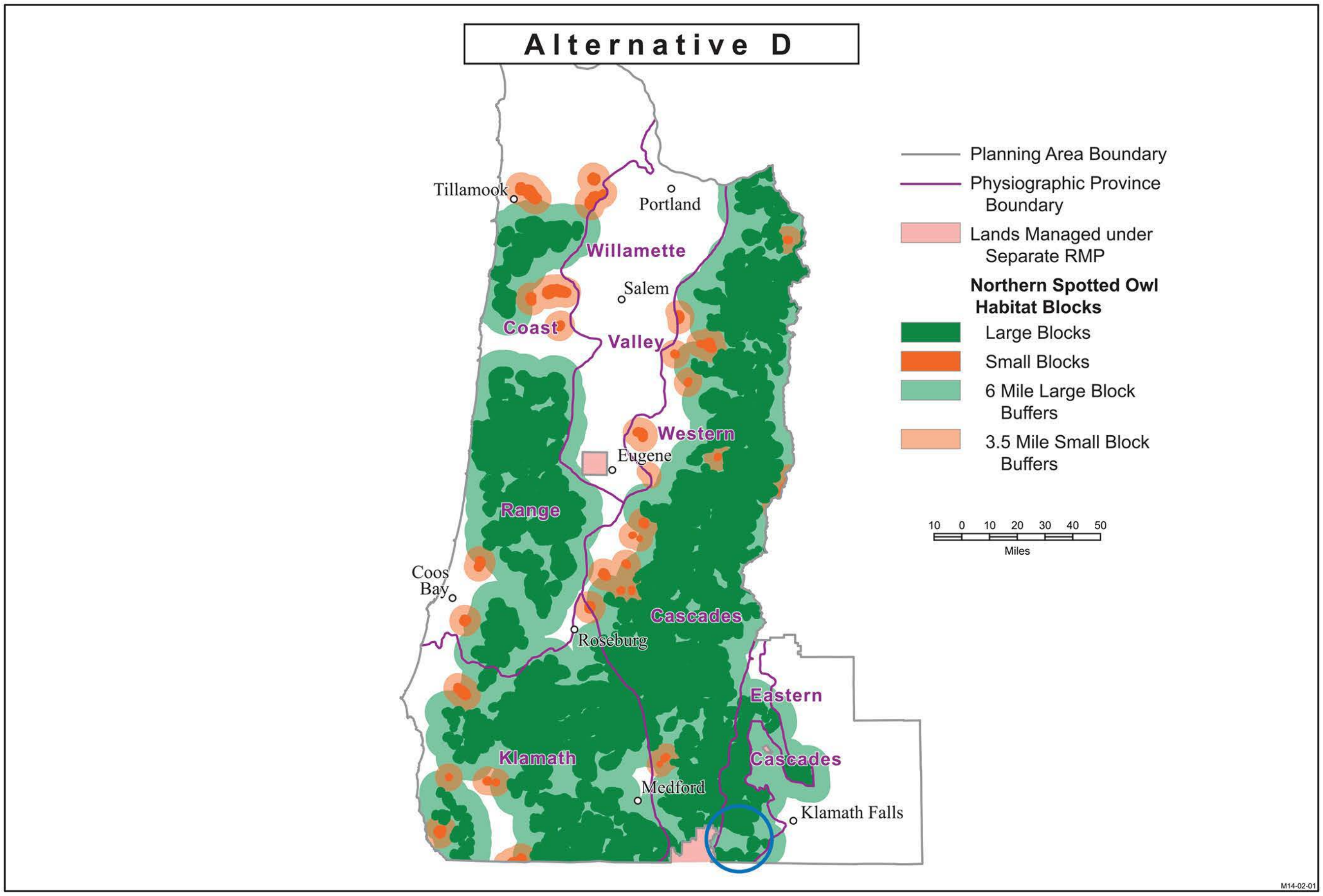


Figure 3-189. Northern spotted owl habitat block locations in 2063 under the No Action alternative and each of the action alternatives.
The green circles on some maps are discussed in the text.

There are few substantive differences among the alternatives in the development of large habitat blocks over time. Most notably:

- By 2063 (**Figure 3-189**, No Action alternative), habitat block development in the northern half of the Oregon Coast Range Province (green circle) would develop better under the No Action alternative than as indicated by the No Timber Harvest Reference Analysis (**Figure 3-187**, 2063), indicating the benefit of restoration thinning under the No Action alternative.
- Under all alternatives except the No Action alternative and Alternative C, a large habitat block would develop by 2063 in the southeastern corner of the Oregon Klamath Province (green circles).

The remaining differences among the alternatives are negligible in terms of their overall contributions to Conservation Need 1. In fact, the different Late-Successional Reserve designs would make surprisingly similar contributions to the development of large habitat blocks over time. All alternatives reserve those lands necessary to support large habitat blocks and, once those lands are reserved, reserving additional lands provides little added support to the development and spacing of large habitat blocks.

Issue 2

In accordance with Conservation Need 2, would the alternatives contribute to a landscape in the planning area that facilitates northern spotted owl movement between and through large blocks of nesting, roosting and foraging habitat and ensures the survival of dispersing owls?

Summary of Analytical Methods

To meet Conservation Need 2, the BLM would contribute to a western Oregon landscape that, within 30 to 50 years, supports northern spotted owl movement and survival between the physiographic provinces, and between and through the large blocks of nesting, roosting and foraging habitat within each physiographic province. Because this conservation need is not specific to BLM-administered lands, the BLM forecasted the development of northern spotted owl dispersal habitat, and simulated northern spotted owl movement and survival, on all lands in the planning area during the next 50 years.

This issue presents an analysis of the cumulative effects on northern spotted owl dispersal habitat and northern spotted owl movement and survival of past, present, and reasonably foreseeable future actions, including both land management on BLM-administered lands and non-BLM-administered lands in the planning area.

Even though Thomas *et al.* (1990, pp. 27-29, Appendix J) and Courtney *et al.* (2004, Chapter 5) defined the structural characteristics of dispersal habitat, the scientific literature on the northern spotted owl does not define the quantity or spatial arrangement of such habitat needed to support spotted owl movement or the survival of dispersing owls. Instead, Thomas *et al.* (1990, pp. 27 and 309-310) stated that, if 50 percent of the land in a regulated forest supported stands that were older than 40 years (i.e., had an average trunk diameter of at least 11 inches [0.3 m] at breast height and a canopy closure of at least 40 percent), and were managed in association with stands of older forest (*e.g.*, visual and riparian corridors, and stands harvested on relatively long rotations), then “We would expect much of that managed landbase to be suitable for passage by dispersing northern spotted owls.” Although Forsman *et al.* (2002) subsequently examined northern spotted owl dispersal, the relationship between the degree of forest fragmentation, and the movement and survival of dispersing owls, was beyond the scope of their study (p. 22).

Davis *et al.* (2011, pp. 40-43) first modeled the spatial arrangement of habitat needed to support the movement of northern spotted owls. Davis *et al.* based their model on empirical evidence that at least 40 percent habitat within (i.e., at the scale of) a 15.5-mile (25.0 km) radius circle is sufficient to support dispersing northern spotted owls (p. 40). Marcot *et al.* (2012, p. 202), based on modeling, reported similar results, stating “The various combinations of size and spacing of habitat clusters that produced at least 35-40% of the landscape in habitat seemed adequate to provide for successful NSO [northern spotted owl] dispersal and recolonization.”

To evaluate northern spotted owl movement, the BLM produced decadal maps of habitat in the planning area capable of supporting such movement, relying on the distance and habitat quantity thresholds developed by Davis *et al.* (2011, p. 40). As described in Appendix S, to conform to BLM planning needs to forecast habitat change, the BLM northern spotted owl relative habitat suitability surfaces differed from that used by Davis *et al.* (2011).

In addition to northern spotted owl movement between habitat blocks, Conservation Need 2 addresses habitat conditions outside habitat blocks that support the survival of dispersing northern spotted owls (i.e., all life functions until a northern spotted owl can establish a territory). To address northern spotted owl survival, the BLM modeled how northern spotted owls would move and survive across the planning area under each alternative and over time. Below, under Northern Spotted Owl Issue 4 (Conservation Need 4), the BLM describes its use of HexSim (Schumaker 2011), a spatially-explicit, individual-based population model. As part of the BLM analyses to address Conservation Need 4, the BLM used HexSim to simulate the movement of individual northern spotted owls across a spatial landscape of 214-acre (86.6-ha) hexagons, during 50 years, completing 100 replicate, non-stochastic simulations of each alternative (see Issue 4). Each of the 100 replicate simulations was unique in terms of the beginning numbers and locations of simulated northern spotted owls (*Appendix S*). Therefore, in addition to addressing Conservation Need 2 by mapping dispersal-capable habitat conditions by alternative over time, the BLM used HexSim to aggregate, by alternative and by decade, the movement pathways of simulated northern spotted owls. The products were decadal maps of simulated dispersal flux—the number of times, during 100 replicate simulations, a simulated northern spotted owl passed through each 214-acre (86.6-ha) hexagon during a decade—on all lands in the planning area. Because the BLM HexSim model simulates northern spotted owl survival, including the survival of dispersing young (USDI FWS 2011a, pp. C-70 – C-71), dispersal flux reflects both northern spotted owl movement and survival.

Affected Environment and Environmental Effects

Figure 3-190 shows the dispersal-capable landscape of the planning area in 2013 (**A**), and as the forested landscape managed by the BLM is capable of contributing to dispersal capability in 2063 (**B**) according to the No Timber Harvest Reference Analysis. Because the No Timber Harvest Reference Analysis simulates only the effects of forest ingrowth and wildfire on BLM-administered lands, the BLM shows only these two decadal maps; the intermediate decadal maps show a transition of dispersal-capable lands between those in **Figure 3-190**.

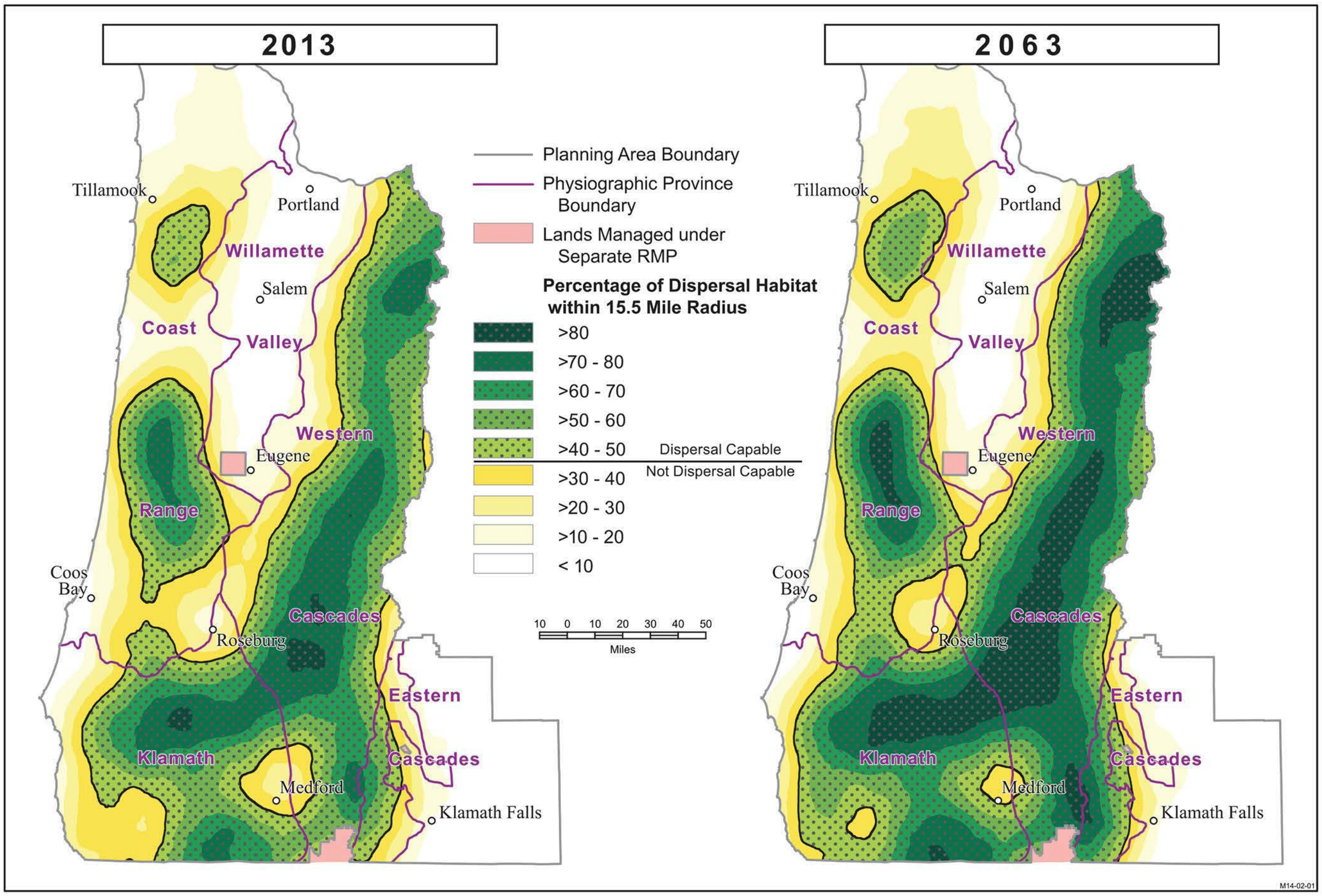


Figure 3-190. The northern spotted owl dispersal-capable landscape in 2013 (A) and 2063 (B), according to the No Timber Harvest Reference Analysis.

Currently, BLM-administered lands contribute to north-south northern spotted owl movement throughout the Oregon Western Cascades Province and through much of the Oregon Klamath Province (**Figure 3-190 A**). However, current habitat conditions do not support adequate north-south northern spotted owl movement through much of the Oregon Coast Range Province or between the Oregon Coast Range and the other physiographic provinces. According to the No Timber Harvest Reference Analysis, the forested landscape managed by the BLM is capable of progressively improving the dispersal-capable landscape during the next 50 years (**Figure 3-190 B**), contributing to adequate north-south northern spotted owl dispersal through the southern half of the Oregon Coast Range Province and between the Oregon Coast Range and the Oregon Klamath and Oregon Western Cascades provinces. However, current habitat conditions and limited BLM-administered land in the northern half of the Oregon Coast Range Province prevent the BLM from contributing to adequate northern spotted owl dispersal in much of that area.

Figure 3-191 shows potential northern spotted owl dispersal flux across the planning area during 2013-2023 (**A**) and 2053-2063 (**B**), according to the No Timber Harvest Reference Analysis. Because the No Timber Harvest Reference Analysis simulates only the effects of forest ingrowth and wildfire on BLM-administered lands, the BLM shows only these two decadal maps; the intermediate decadal maps show a transition of dispersal flux between those in **Figure 3-191**. The landscape shown in **Figure 3-191** is divided into a grid of 214-acre (86.6-ha) hexagons, and the color of each hexagon reflects the number of "dispersal events" (i.e., the number of times a simulated female northern spotted owl moved though a hexagon during 100 replicate simulations) during each decade. Dark purple (such as in the Willamette Valley) indicates less than 30 events per decade, or essentially no northern spotted owl movement and survival. Light purple indicates 29 to 75 events per decade, or marginal movement and survival (i.e., in about half the simulations, a northern spotted owl moved through the hexagon once during the decade). Movement and survival function increases through dark red, which indicates greater than 627 dispersal events per decade.

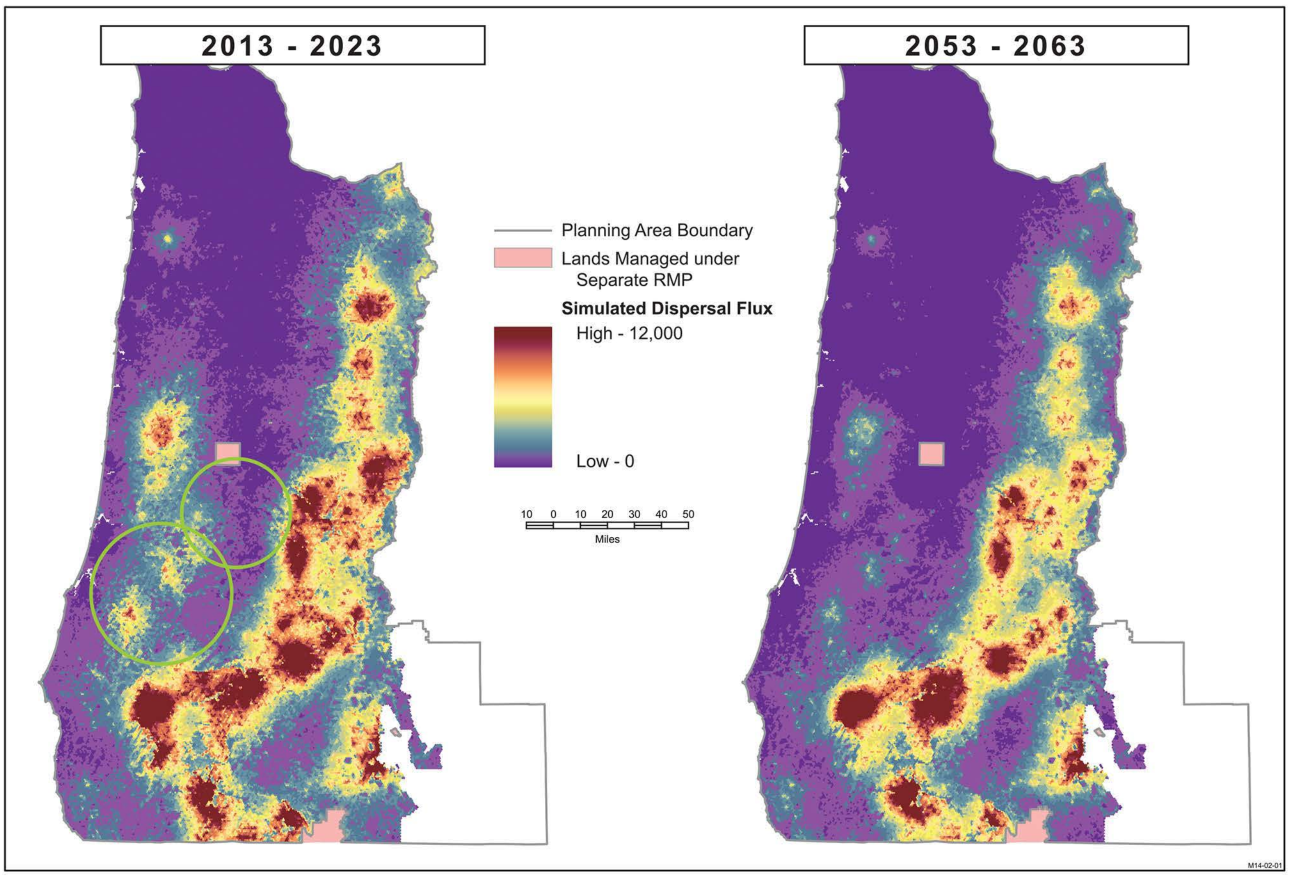


Figure 3-191. No Timber Harvest Reference Analysis: Simulated northern spotted owl dispersal flux during 2013-2023 (A) and 2053-2063 (B), based on 100 replicate, non-stochastic, simulations. Circles in A indicate two areas discussed in the text.

Figure 3-191 A indicates, under current habitat conditions, northern spotted owl movement and survival between and through habitat blocks in the Oregon Western Cascades, Oregon Eastern Cascades and Oregon Klamath physiographic provinces, and between the Oregon Coast Range Province and the Western Cascades and Klamath provinces. However, due to limited habitat, northern spotted owls currently do not move through much of the northern half of the Coast Range Province, an area with limited BLM-administered land (see **Figure 3-192** below).

A visual comparison of the current dispersal-capable landscape (**Figure 3-190 A**) and dispersal flux under current habitat conditions (**Figure 3-191 A**) reveals an informative incongruity. **Figure 3-191** shows simulated northern spotted owls moving though areas that **Figure 3-190** suggests are not dispersal-capable, such as the east-west corridor between the Oregon Coast Range and Oregon Western Cascades provinces, south of the Willamette Valley, and the north-south corridor through the southern portion of the Oregon Coast Range Province (both areas highlighted by green circles in **Figure 3-191 A**). These discrepancies appear to be artifacts of scale: **Figure 3-190** is based on mean habitat availability within a 15.5-mile radius circle (~ 196,000 ha) whereas **Figure 3-191** is based on mean habitat conditions within a 500-acre (~ 200-ha) circle (see *Appendix S* for an explanation). Thus, the delineation of dispersal capability in **Figure 3-190** is more heavily influenced by edge effects of large areas that do not support northern spotted owl habitat, such as the Willamette Valley or the Pacific Ocean, than is dispersal flux shown in **Figure 3-191**. **Figure 3-190 B** shows that, within 50 years, BLM-administered lands are capable of contributing to a dispersal-capable, east-west “bridge” between the Oregon Coast Range and Oregon Western Cascades provinces. However, **Figure 3-191** A suggests that this area currently supports (albeit marginal) northern spotted owl movement, but that functionality (shown in **Figure 3-190 A**) is obscured by limited habitat conditions in the Willamette Valley, to the north, and the Umpqua Basin, to the south. This influence also appears as limited north-south dispersal function through the southern Oregon Coast Range Province, which is across a mostly-forested landscape bordered on the east and west by areas with limited habitat.

Interestingly, a comparison of **Figure 3-191 A** and **B** indicates that northern spotted owl dispersal flux would decline in much of the planning area each decade through 2053–2063 (this last decade is shown as **Figure 3-191 B**), most notably in the Oregon Coast Range Province and the northern portion of the Oregon Western Cascades Province. As shown in **Figure 3-190 B**, this decline is independent of the ability of BLM-administered lands to contribute to dispersal habitat conditions by that decade. Instead, as the BLM describes below in Issue 4, this decline is a function of forecasted declines in northern spotted owl populations in some provinces. Fewer northern spotted owls on the landscape progressively reduce the number of individuals dispersing across the landscape between 2013 and 2063, as seen by comparing **Figure 3-191 A** and **B**.

The analysis of dispersal flux also indicates the association, in the southern portion of the Oregon Coast Range Province and the central Oregon Klamath Province, between current northern spotted owl movement and survival and BLM-administered lands, which can be seen by comparing **Figures 3-184 A** and **3-192**. (**Figure 3-192** is identical to **Figure 3-191 A** except that **Figure 3-192** also delineates BLM-administered lands.) This indicates that BLM-administered lands make important contributions to northern spotted owl movement and survival in these areas.

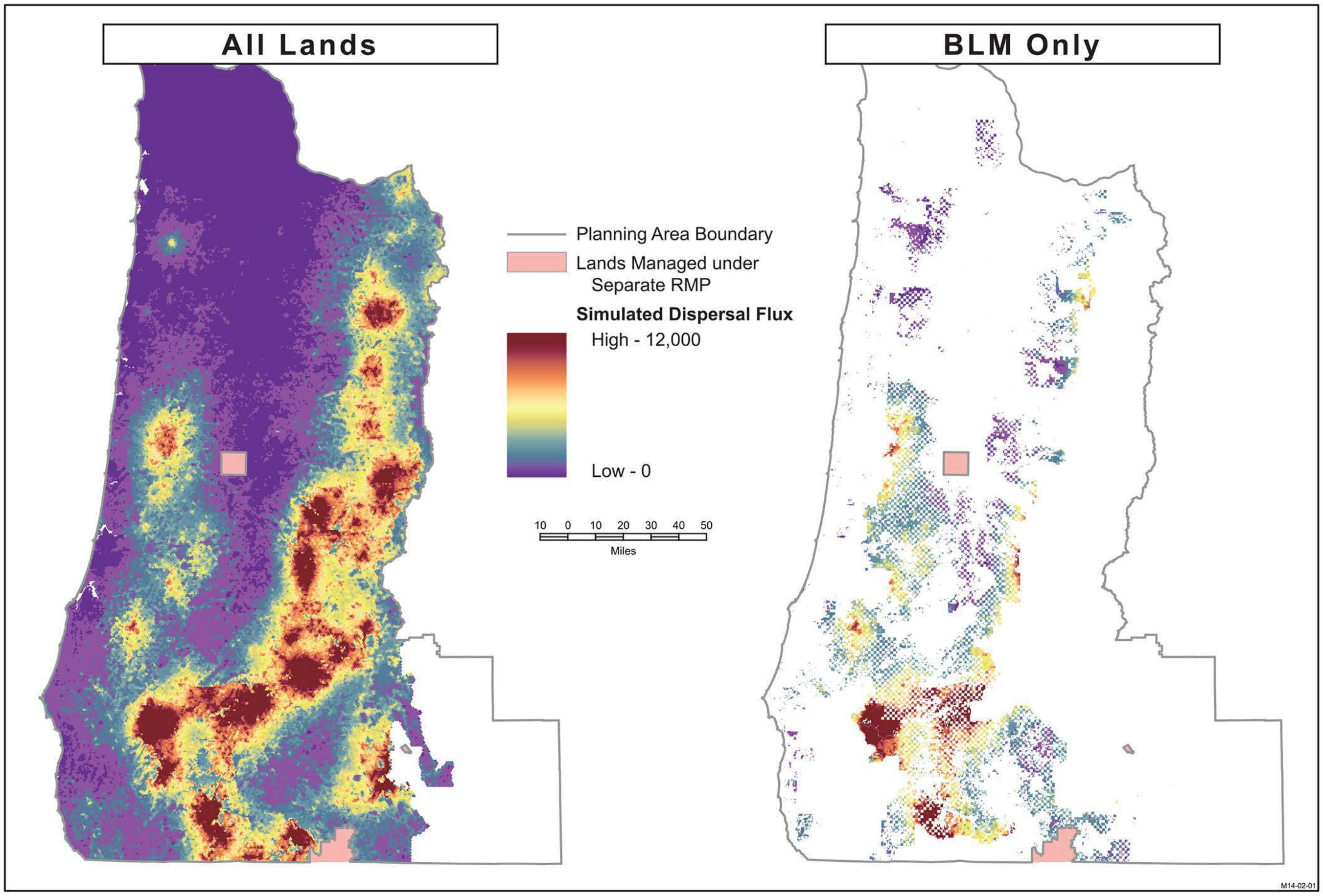
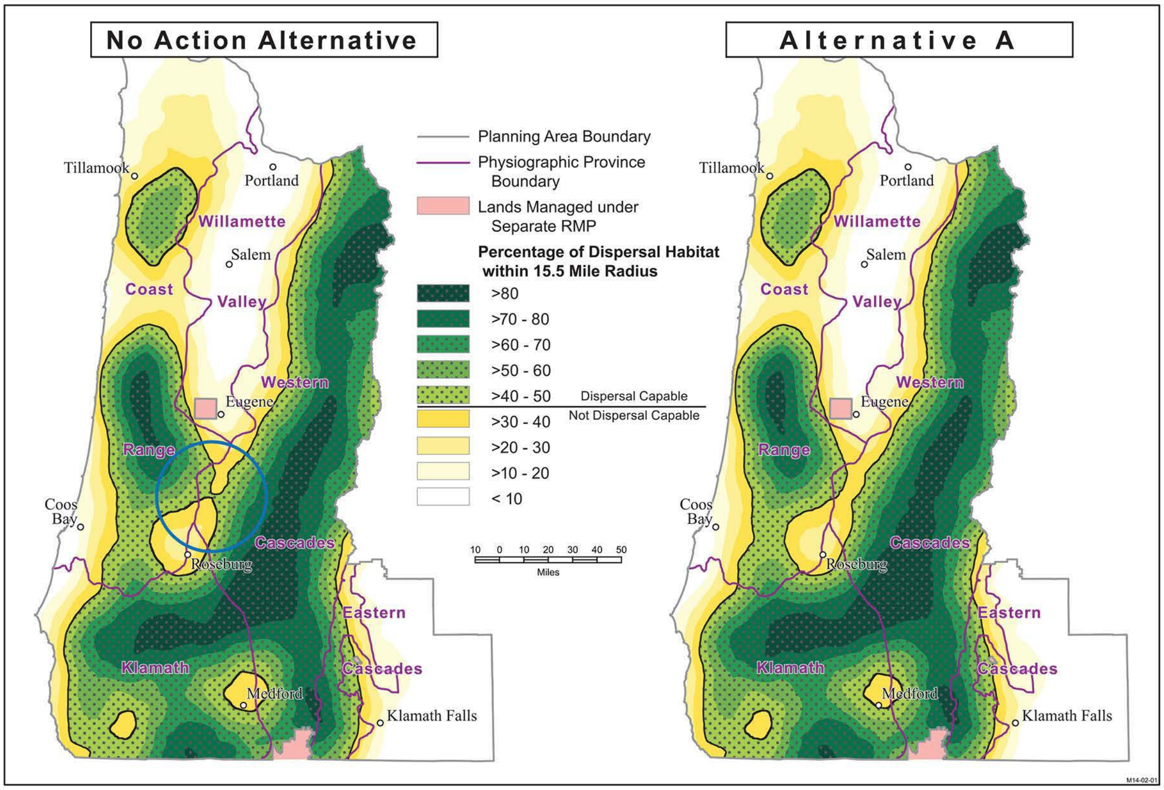
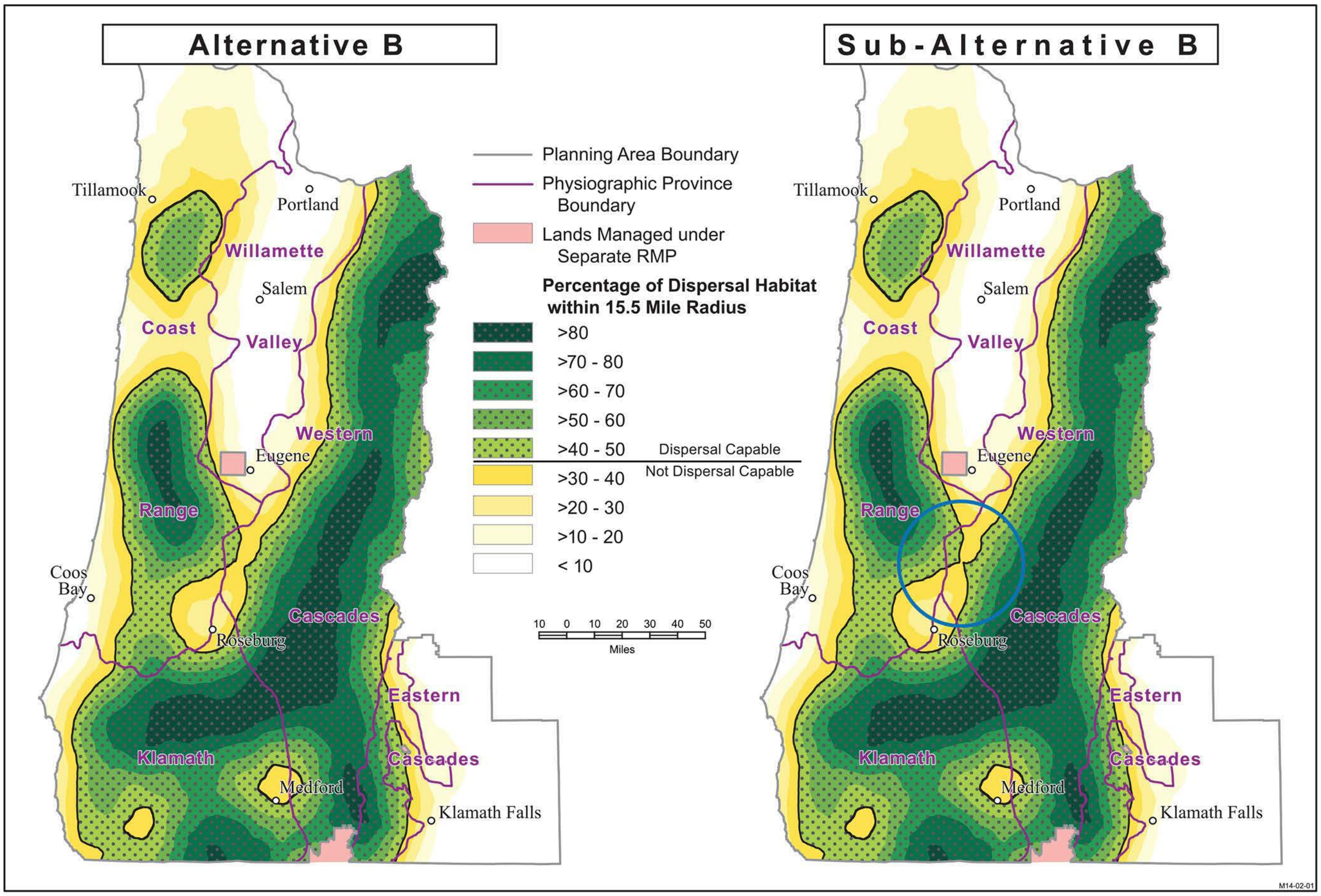
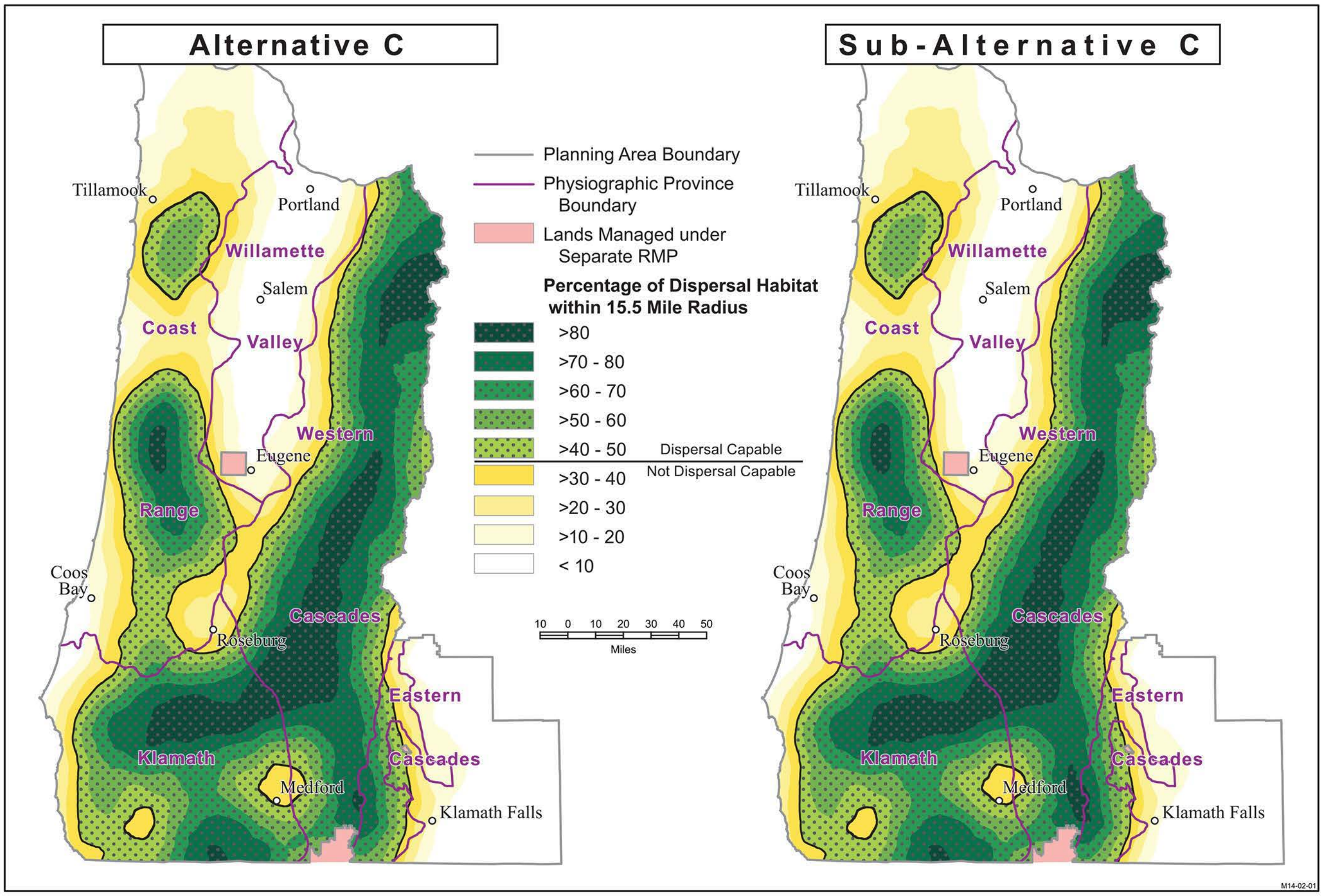


Figure 3-192. No Timber Harvest Reference Analysis: Dispersal flux (2013-2023), based on 100 replicate, non-stochastic, simulations.

Figure 3-193 shows the northern spotted owl dispersal-capable landscape as it would develop in 50 years under the alternatives. With the exception of the northern half of the Oregon Coast Range Physiographic Province in which, as noted above, the BLM has no opportunity to contribute to adequate dispersal habitat, during the next 50 years, under each alternative, the BLM would contribute to a landscape in the planning area that supports northern spotted owl movement between and through large blocks of nesting, roosting and foraging habitat. However, as shown in **Figure 3-193**, the No Action alternative, Sub-alternative B and Alternative D would better support east-west northern spotted owl dispersal-capability between the Oregon Coast Range and Oregon Western Cascades provinces (the area highlighted by green circles in **Figure 3-193**) then would the other alternatives and comparable to the full capability of BLM-administered lands determined by the No Timber Harvest Reference Analysis (**Figure 3-190 B**). In its final rule (77 FR 71922), the U.S. Fish and Wildlife Service identified east-west connectivity through this area as essential to the conservation of the northern spotted owl.


No Action Alternative
Alternative A
Planning Area Boundary
Physiographic Province Boundary
Lands Managed under Separate RMP
Percentage of Dispersal Habitat within 15.5 Mile Radius
>80
>70 - 80
>60 - 70
>50 - 60
>40 - 50
>30 - 40
>20 - 30
>10 - 20
< 10
Dispersal Capable
Not Dispersal Capable
10 0 10 20 30 40 50
Miles
Tillamook
Portland
Willamette
Salem
Coast
Valley
Western
Eugene
Range
Coos Bay
Cascades
Roseburg
Eastern
Klamath
Cascades
Medford
Klamath Falls
M14-02-01


Alternative B
Sub-Alternative B
Planning Area Boundary
Physiographic Province Boundary
Lands Managed under Separate RMP
Percentage of Dispersal Habitat within 15.5 Mile Radius
>80
>70 - 80
>60 - 70
>50 - 60
>40 - 50
Dispersal Capable
Not Dispersal Capable
>30 - 40
>20 - 30
>10 - 20
< 10
10 0 10 20 30 40 50
Miles
Tillamook
Portland
Willamette
Salem
Coast
Valley
Western
Eugene
Range
Coos Bay
Cascades
Roseburg
Eastern
Klamath
Cascades
Medford
Klamath Falls
M14-02-01


Alternative C
Sub-Alternative C
Planning Area Boundary
Physiographic Province Boundary
Lands Managed under Separate RMP
Percentage of Dispersal Habitat within 15.5 Mile Radius
>80
>70 - 80
>60 - 70
>50 - 60
>40 - 50
Dispersal Capable
Not Dispersal Capable
>30 - 40
>20 - 30
>10 - 20
< 10
10 0 10 20 30 40 50
Miles
Tillamook
Portland
Salem
Eugene
Coos Bay
Roseburg
Medford
Klamath Falls
Willamette
Valley
Coast
Range
Western
Cascades
Eastern
Cascades
Klamath
M14-02-01

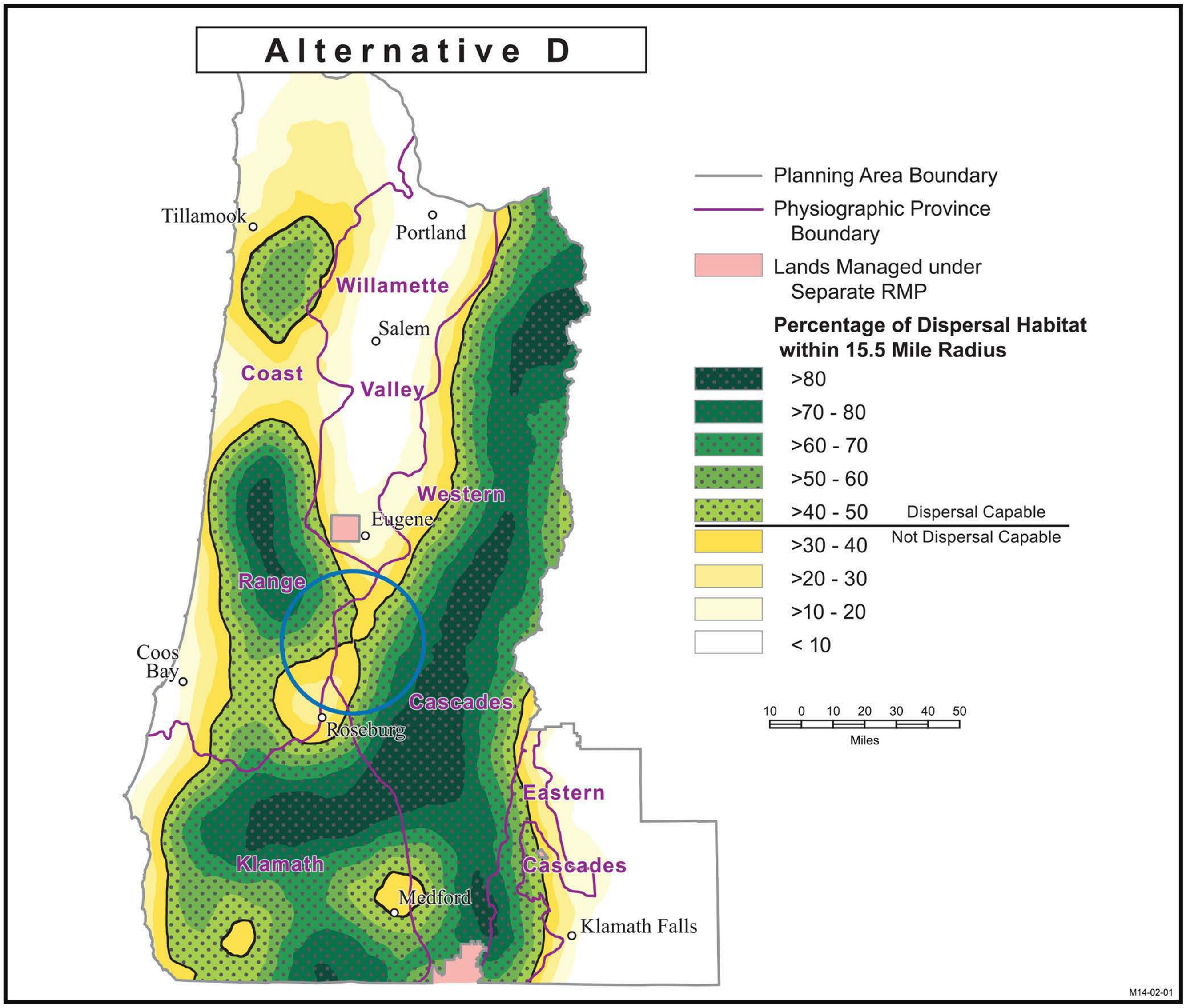


Figure 3-193. Dispersal-capable lands, as they would exist in 2063, under the No Action alternative and the action alternatives.
The circled areas for Sub-alternative B and Alternative D are described in the text.

Maps of northern spotted owl dispersal flux during 2053-2063, for each alternative, and the associated discussion, are shown in Appendix S. Differences in dispersal flux among the alternatives, and between the alternatives and the No Timber Harvest Reference Analysis, are negligible. All alternatives similarly would maximize the BLM contribution to northern spotted owl movement and survival across the planning area over time.

Issue 3

In accordance with <u>*Conservation Need 3*</u>*, would the alternatives contribute to a coordinated, adaptive management effort to reduce the loss of habitat due to catastrophic wildfire throughout the northern spotted owl's range?*

The U.S. Fish and Wildlife Service addresses catastrophic wildfire as a separate Conservation Need. However, wildfire is relevant to northern spotted owl conservation only because it modifies northern spotted owl habitat and, consequently, demography, which the BLM addressed by evaluating Conservations Needs 1, 2 and 4. As explained in **Appendix S**, the relative habitat suitability surfaces the BLM developed to address Conservation Needs 1, 2 and 4 include forecasts of habitat change from wildfire. Thus, the evaluations of Conservation Needs 1, 2 and 4 also address Conservation Need 3. The BLM needed no additional analysis.

Issue 4

In accordance with Conservation Need 4, would the alternatives, in areas of significant population decline, sustain the full range of survival and recovery options for the northern spotted owl in light of significant uncertainty?

Summary of Analytical Methods

To meet Conservation Need 4, the BLM would contribute to a landscape that supports, in light of current uncertainties, reproductively viable northern spotted owl populations in each western Oregon modeling region during the next 50 years or, if the No Timber Harvest Reference Analysis indicates that supporting populations for 50 years is not possible, during the next 30 years. Because this conservation need is not specific to BLM-administered lands, the BLM simulated on all land ownerships the northern spotted owl population responses to habitat changes and competitive interactions with barred owls. The BLM evaluated those population responses in terms of population size, population extirpation risk, and population source location.

This issue presents an analysis of the cumulative effects on northern spotted owl population response of past, present, and reasonably foreseeable future actions, including both land management on BLM-administered lands and non-BLM-administered lands in the planning area.

In 2006, the U.S. Fish and Wildlife Service convened seven experts to identify threats to the northern spotted owl (USDI FWS 2011b). The experts identified past habitat loss, current habitat loss and competition from barred owls as the most pressing threats, even though implementation of the Northwest Forest Plan had reduced the rate of timber harvest on Federal lands. They noted evidence of these threats in the scientific literature. The range of threat scores by the individual experts was narrowest for barred owl competition, indicating more agreement about the threat from barred owls.

Northern spotted owl populations are declining across their range at an annual rate of 2.9 percent (Forsman *et al.* 2011, p. 44). Therefore, "areas of significant population decline" include the entire planning area. A principal cause of the decline is competition from barred owls, which have colonized portions of Washington, Oregon and California during the past forty years. Barred owls now occupy the entire range of the northern spotted owl, utilize all northern spotted owl habitats and prey species, displace northern spotted owls from their breeding territories, inhibit northern spotted owls from establishing new territories and outbreed northern spotted owls (Forsman *et al.* 2011, Van Lanen *et. al*. 2011, Dugger *et al.* 2011, Wiens *et al.* 2014). Although BLM-administered lands play a key role in northern spotted owl conservation in some portions of the planning area (see USDI BLM 2008a[2], pp. 4-644–4-683), current research provides no evidence that the BLM can manage individual forest stands to provide northern spotted owls with a competitive advantage over barred owls (Dugger *et al.* 2011 and Wiens *et al.* 2014). Instead, research reaffirms the importance of older forest conditions and managing for large blocks of unfragmented older forest (Dugger *et al.* 2011, p. 2463; Wiens *et al.* 2014, pp. 36-38).

To address Conservation Needs 1 and 2, the BLM examined potential BLM contributions to northern spotted owl habitat in the planning area: to the formation of blocks of nesting-roosting habitat, to spacing between the blocks, and to habitat conditions that support northern spotted owl movement and survival between and through the blocks. The BLM northern spotted owl relative habitat suitability surfaces include forecasts, on all land ownerships, of forest ingrowth, forest treatment, and wildfire. Therefore, to address Conservation Need 4, the BLM simulated how northern spotted owl populations would respond to changing habitat conditions on a landscape occupied by barred owls. Even though the BLM analyses focused on the planning area, the BLM modeled northern spotted owl population responses throughout the United States-portion of their range, because the movement of northern spotted owls across the planning area boundaries would affect owl populations in the planning area.

Population Modeling

To address Conservation Need 4, the BLM used a spatially-explicit, individual-based HexSim model (Schumaker 2011) to simulate northern spotted owl demographic responses over time.[102] Although computer modeling commonly involves an inherent tension between improved realism and errors associated with increased complexity, HexSim was designed to quantify wildlife population responses to multiple, interacting environmental stressors, as deemed appropriate, without unnecessarily simplifying landscapes, species' life histories, or disturbances. HexSim also can—

- Incorporate environmental stochasticity (i.e., species traits, such as individual fecundity and survival, as probabilities based on observed rates instead of as less-realistic fixed parameters)
- Operate at relatively fine spatial scales, in this case at a scale of 214-acre (86.6-ha) hexagons;
- Generate a full set of demographic response data, including simulated numbers and locations of individual northern spotted owls, at any year, which is important for BLM evaluations of northern spotted owl responses to alternatives; and
- Generate both rate-based and count-based matrices for each modeling region during each decade.
    - Count-based matrices record the numbers of individuals moving between locations, important for evaluating northern spotted owl movement and survival.
    - Rate-based matrices are important for evaluating how habitat change affects the northern spotted owl population in an ecologically meaningful way,[103] and the locations and magnitudes of population sources and sinks.[104]

The BLM determined that the HexSim model developed by the U.S. Fish and Wildlife Service to inform its decisions on northern spotted owl recovery and critical habitat (USDI FWS 2011a, Appendix C, USDI FWS 2012), with specific changes, would meet, and could be adapted to, BLM planning needs with cost and technical efficiency (i.e., this model incorporated appropriate information on northern spotted owl demography and ecology, including barred owl competition, without introducing unnecessary analytical

[102] Due to the number of biological and physical variables that affect northern spotted owl demography, some of which are not fully understand, no model can accurately forecast a northern spotted owl demographic response over 50 years. However, the BLM determined that an individual-based HexSim model represented the best analytical tool to simulate northern spotted owl responses to alternative BLM land use scenarios, and thus to help inform BLM decision-making (see *Appendix S*).

[103] The BLM arrayed parameters driving population change analytically instead of inferring such parameters from habitat patterns, as was done in previous land use planning efforts at this scale (i.e., the 1994 Northwest Forest Plan and the 2008 BLM Western Oregon Plan Revisions).

[104] "Sources" are areas that add members to a population. "Sinks" are areas that consume members of a population. Whether an area is a source or sink depends on its balance of birth : death or emigration : immigration rates.

assumptions or complexity). The BLM described its changes to the Service's HexSim model in Appendix S.

Analytical Scales

The BLM evaluated its contributions to conservation needs 1 and 2 using the physiographic provinces (USDA USFS and USDI BLM 1994, p. A-3), because Thomas *et al.* (1990, p. 320) defined northern spotted owl median home range sizes—which they used to define large habitat blocks—for each physiographic province. More recently, Davis *et al.* (2011, pp. 34-36) modeled northern spotted owl relative habitat suitability values according to six modeling regions that were similar to the physiographic provinces but based exclusively on ecological divisions (*i.e*., unlike the physiographic provinces, two modeling regions crossed state boundaries). And the U.S. Fish and Wildlife Service, during its process to delineate northern spotted owl critical habitat, divided the northern spotted owl range into eleven modeling regions (USDI FWS 2011a, pp. C-7–C-13) on all land ownerships that reflected "regional differences in forest environments and factors such as important prey species" (USDI FWS 2011a, p. C-7). Again, the Service modeling regions (**Figure 3-194**) were similar to the physiographic provinces but four of the regions crossed state boundaries.

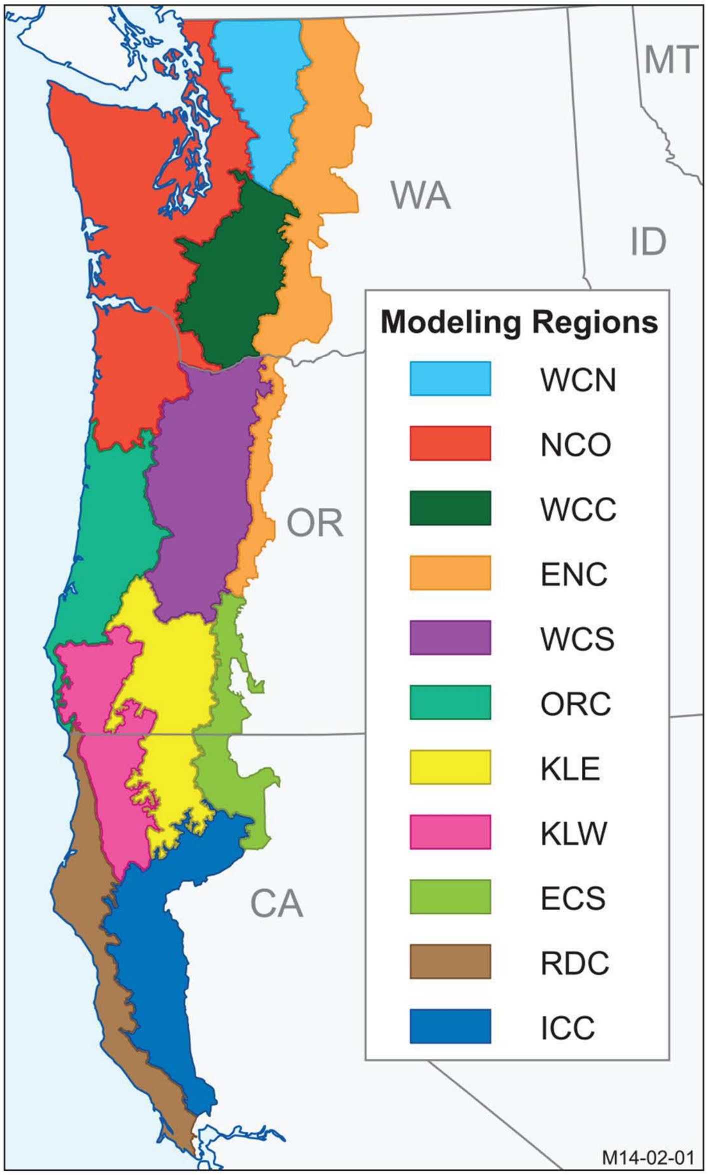


Figure 3-194. U.S. Fish and Wildlife Service (2011a, pp. C-7–C-13) modeling regions.
Acronyms are defined in **Table 3-263** below.

To address Conservation Need 4, the BLM tabulated results at the scales of the physiographic provinces and the U.S. Fish and Wildlife Service modeling regions, because Schumaker *et al.* (2014, p. 585) found key insights by comparing simulated northern spotted owl responses at different scales. The BLM considered tabulating results only for the planning area (i.e., by truncating modeling regions that extended into California or Washington at state boundaries), because BLM planning decisions would affect only BLM-administered lands in the planning area. Additionally, tabulating results for regions that extend into another state—some of which occur mostly in another state—might "dilute" the analytical effects of BLM alternatives. However, the BLM decided to tabulate data by entire modeling regions because those regions are most appropriate for examining northern spotted owl population extirpation risk and population sources. Aware of the limitations of its model, and that the BLM would use results mainly to compare alternatives, the BLM felt that tabulating results by entire modeling regions more accurately would reflect northern spotted owl responses to BLM alternatives unaffected by biologically-arbitrary divisions at state boundaries. The BLM chose not to tabulate results by the Davis *et al.* (2011, pp. 34-36) modeling regions, because it felt that their larger modeling regions, only three of which occurred in the planning area, were too coarse to inform BLM planning decisions.

Barred Owl Encounter Rates

The BLM included the influence of barred owl competition in the modeling of northern spotted owl population response. Barred owl competition is reflected in the population modeling by a barred owl encounter rate—the estimated probability, based on observation, that a northern spotted owl will encounter a barred owl in the northern spotted owl's territory—which, in the HexSim model, affects northern spotted owl survival. The BLM analyzed the alternatives and ran the No Timber Harvest Reference Analysis using current barred owl encounter rates. The BLM ran a second No Timber Harvest Reference Analysis and a second analysis of Alternative C, both using modified barred owl encounter rates that reflect a hypothetical scenario of barred owl control.

The BLM used barred owl encounter rates calculated by the U.S. Fish and Wildlife Service. Forsman *et al.* (2011, Appendix B) estimated barred owl encounter rates for each demographic study area in the northern spotted owl's range. Based on their work, the U.S. Fish and Wildlife Service (USDI FWS 2011a, p. C-66, Table C-25) estimated the current encounter rate in each modeling region.[1] These rates are shown in the third column of **Table 3-263**.

Table 3-263. Estimated (current) and modified barred owl encounter rates (USDI FWS 2011a, p. C-66 and Table C-25; and USDI FWS 2012, p. 27 and Table 4).

Modeling Region*	Acronym	Estimated Encounter Rate	Modified Encounter Rate
North Coast and Olympics**	NCO	0.505	0.375
East Cascades-North	ECN	0.296	0.375
West Cascades-North	WCN	0.320	0.375
West Cascades-Central	WCC	0.320	0.375
Oregon Coast**	ORC	0.710	0.375
West Cascades-South**	WCS	0.364	0.375
Inner California Coast Range	ICC	0.213	0.250
East Cascades-South**	ECS	0.180	0.250
Klamath-Siskiyou-East**	KLE	0.245	0.250
Klamath-Siskiyou-West**	KLW	0.315	0.250
Redwood Coast	RDC	0.205	0.250

* The names of some modeling regions differ from those shown elsewhere in USDI FWS 2011a:C-9–C-13.
** Modeling regions entirely or partially in the planning area.

During its final simulations to inform its decisions on northern spotted owl critical habitat, the U.S. Fish and Wildlife Service modified barred owl encounter rates to isolate the effects of habitat on simulated northern spotted owl populations and evaluate the relative contributions of different critical habitat scenarios to northern spotted owl recovery (USDI FWS 2012, pp. 26-27). If the Service had used current barred owl encounter rates in their analysis, the overwhelming negative influence of barred owls would have confounded the results (USDI FWS 2012, p. 26). These modified encounter rates are shown in the fourth column of **Table 3-263**.

[1] The BLM verified with Robert Anthony, Oregon Cooperative Wildlife Research Unit, Oregon State University, that the current barred owl encounter rate in the Oregon Coast Modeling Region reasonably reflected observed barred owl abundance in that region (pers. com. via e-mail to Eric Greenquist, June 18, 2013).

At the suggestion of the U.S. Fish and Wildlife Service, the BLM conducted a second No Timber Harvest Reference Analysis using the Service's modified barred owl encounter rates to help parse out the differential effect of habitat changes over time from the effects of barred owls.[2] The BLM recognized that the relatively high current barred owl encounter rate observed in the Oregon Coast Modeling Region might prevent northern spotted owl persistence in that region regardless of habitat development on BLM-administered lands. Modeling the No Timber Harvest Reference Analyses with both current and modified barred owl encounter rates allowed the BLM to evaluate the influence of barred owls coupled with maximum habitat development on BLM-administered lands, bracketing the possible influence of the alternatives on the northern spotted owl population in the hypothetical scenario of barred owl control. In addition, after evaluating northern spotted owl population responses to the alternatives using current barred owl encounter rates, the BLM ran a second analysis of Alternative C using modified barred owl encounter rates. Based on the population responses under each alternative using current encounter rates, the BLM felt that analyses of the No Timber Harvest reference scenario and Alternative C, using modified rates, would bracket the outcomes of all alternatives using modified rates.

The U.S. Fish and Wildlife Service confirmed that the modified barred owl encounter rates that it used during its Phase 2 HexSim modeling (USDI FWS 2012, pp. 25-27) reflect a hypothetical scenario that might result if the Service implemented a barred owl management program during the next 10 to 30 years (Betsy Glenn, U.S. Fish and Wildlife Service, pers. com. via phone [October 21, 2014] and e-mail [October 22, 2014] to Eric Greenquist). Therefore, in the No Timber Harvest reference analysis and analysis of Alternative C with modified barred owl encounter rates, the BLM, as advised by the Service, held barred owl encounter rates at current levels during 2013 – 2023 (to reflect the period of the current study and the initiation of a hypothetical barred owl management program), and then, beginning in 2023, changed barred owl encounter rates to the altered levels used by the Service (**Table 3-263**, fourth column; see also USDI FWS 2014, p. 27, Table 4) in all modeling regions except the North Coast and Olympic and Oregon Coast.[3] In these latter two regions, where barred owl encounter rates were higher than in the

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[2] The requirements of regulations and BLM NEPA policy compel the BLM to use current estimated barred owl encounter rates in this NEPA analysis, but afford the BLM the discretion to include additional analysis using modified encounter rates.

The U.S Fish and Wildlife Service is removing barred owls from three study areas in California, Oregon, and Washington to evaluate the feasibility, cost and effectiveness of barred owl removal (USDI FWS 2013). The Service completed initial experimental removals in the California study area in 2014 but postponed experimental removals in the Oregon and Washington study areas because of funding limitations. The Service's action is relevant to this analysis because Council on Environmental Quality regulations for implementing NEPA direct that NEPA analyses address cumulative effects, which include the effects of "reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions" (40 CFR 1508.7). The BLM NEPA Handbook explains that "[r]easonably foreseeable future actions are those for which there are existing decisions, funding, formal proposals, or which are highly probable based on known opportunities or trends" (USDI BLM 2008, p. 59). Since the U.S. Fish and Wildlife Service does not currently propose to conduct barred owl removal beyond its current study, future barred owl control by the Service is not reasonably foreseeable for the purpose of NEPA analysis. For this reason, the BLM must use current, estimated barred owl encounter rates in its analysis of the alternatives. This is not to suggest that the Service will never take future action to control barred owls; the BLM simply acknowledges that future barred owl control is speculative at this time.

That said, the BLM NEPA Handbook establishes that the BLM also has discretion regarding analysis of actions that are not reasonably foreseeable, stating that additional analysis of speculative future actions "is not required but may be useful in some circumstances" (USDI BLM 2008, p. 59). Given this flexibility, the BLM decided to run a second No Timber Harvest Reference Analysis, based on the modified barred owl encounter rates developed by the Service, to help bracket the potential effects of habitat development on BLM-administered lands on northern spotted owl population responses.

[3] The modified barred owl encounter rates from the U.S. Fish and Wildlife Service reflect the combined effects of future changes in barred owl populations and implementation of a barred owl management program. In some modeling regions, these modified encounter rates increase from current encounter rates because of an anticipated

other modeling regions, the BLM, as advised by the Service, reduced the 2023 – 2033 encounter rates to 0.440 in the North Coast and Olympic Modeling Region and 0.543 in the Oregon Coast Modeling Region, and then, beginning in 2033, to the rates used by the Service (USDI FWS 2014) (and shown in **Table 3-263**).

Population Change Analysis

As described above, the BLM simulated northern spotted owl demographic responses over 50 years (2013 – 2063) with relative habitat suitability values changing every decade according to BLM forecasts, and then held habitat values constant after 50 years and allowed each of 500 replicate simulations to run to 100 years (2113). This allowed the BLM to compare the alternatives in terms of simulated northern spotted owl population change and trend during years 2013 - 2063 and the ability of habitat conditions in 2063 to support stable northern spotted owl populations. The BLM ran both environmentally stochastic and non-stochastic simulations. In stochastic simulations, the BLM allowed the fecundity and survival of individual northern spotted owls to vary probabilistically according to observed rates. In non-stochastic simulations, the BLM fixed those variables as the mean of observed rates. The stochastic model introduced more variability between replicate simulations (thus, requiring 500 replicates), making it more reliable for evaluating extinction risk over time using quasi-extinction thresholds (described below); the non-stochastic model eliminated that variability (thus requiring only 100 replicates), making it more reliable for evaluating overall population responses to changing habitat conditions.

Population Risk Analysis

In this analysis, the BLM used population thresholds of 250 and 100 females in each modeling region, respectively representing moderate and high population risk The BLM set these population thresholds consistent the thresholds used by the U.S. Fish and Wildlife Service during its process to delineate critical habitat for the northern spotted owl.

The HexSim model developed by the U.S. Fish and Wildlife Service and adapted by the BLM simulates female northern spotted owls that reproduce probabilistically (i.e., the model does not simulate male northern spotted owls or rely on northern spotted owl pair formation). The Service designed the model this way because female northern spotted owls are more influential on population dynamics (USDI FWS 2011a, p. C-56). However, this feature also allows simulated females to reproduce independently of population size and density. Thus, simulated northern spotted owl populations could decline independently of an Allee effect; i.e., an effect to individual fitness (e.g., from inbreeding depression or reduced encounters between potential mates) that can occur at low population levels and cause sudden, local extirpation (Akcakaya 2000, p. 3; Singleton 2012, p. 146). This concerned the BLM because barred owl encounter rates, in the BLM model, affect northern spotted owl survival. Since the BLM model applied observed barred owl encounter rates uniformly over a modeling region because available data do not allow for greater refinement, the affect to northern spotted owl survival might provide no option for long-term northern spotted owl persistence in some regions (i.e., local extirpation might be statistically predetermined by the parameters of the BLM model). Since the BLM did not design its HexSim model to account fully for small population processes, the BLM anticipated situations where regional forecasts of northern spotted owl populations might become so low as to be unreliable.

In previous applications of HexSim, in which modelers did not design their models to account fully for small population processes, modelers relied on quasi- or pseudo-extinction thresholds. The U.S. Fish and Wildlife Service, during its process to delineate critical habitat for the northern spotted owl, set quasi-

barred owl population increase coupled with the partial offset of that increase by the anticipated barred owl management program.

extinction thresholds of 250 and 100 females in each modeling region, respectively representing moderate and high population risk, and range-wide thresholds of 1,250 and 1,000 females, also respectively representing moderate and high population risk (USDI FWS 2012, pp. 19-21, 30-32). The Service set these levels based on what constituted a "high risk of extinction"(USDI FWS 2012, p. 20) at each scale. The Service based these thresholds on northern spotted owl biology and general principles of conservation biology (Betsy Glenn, personal communication to Eric Greenquist, 10/15/2014.); the Service did not base these thresholds on empirical evidence of extinction risk, because such data do not exist. Dunk *et al.* (2014, p. 9), using the U.S. Fish and Wildlife Service modeling regions, used a similar approach for their evaluation of northern spotted owls in western Washington, stating that a population of 100 individual northern spotted owls "represents a population size below which we believe Spotted Owls would be in danger of becoming extirpated," and "a population of grave concern." Again, Dunk *et al.* (2014, p. 9) did not base their threshold on empirical evidence of extinction risk, stating, "One hundred individuals is not necessarily a 'tipping point' population size;" instead, it provides "a quantitative threshold that allows for comparison among the baselines and alternative conservation scenarios." Heinrichs *et al.* (2010, p. 2233), in their simulations of a small population of kangaroo rats, developed quasi-extinction thresholds that, again, were based on expert opinion informed by *a posteriori* analyses that compared how their model performed with alternate thresholds (Julie Heinrichs, University of Washington, personal communication via e-mail to Eric Greenquist, 11/13/2013). And Singleton (2012, p. 146), in his analysis of northern spotted owls in the eastern Cascades of Washington, developed a *relative index* of pseudo-extinction rate based on the calculated carrying capacity of his study area, estimating that extinction risk was high when simulated northern spotted owl populations fell below 10 percent or 20 percent of the calculated carrying capacity. *Relative index* is important because Singleton only compared the results of different modeling scenarios and did not attempt to forecast actual extinction events (Singleton 2012, p. 146, and Peter Singleton, Pacific Northwest Research Station, U.S. Forest Service, personal communication via e-mail to Eric Greenquist, 11/13/2013).

For its analyses, the BLM relied on the quasi-extinction thresholds established by the U.S. Fish and Wildlife Service: 250 and 100 females in a modeling region. A regional population of no more than 250 females is at risk for extirpation, because it is vulnerable to small population processes and stochastic events; a regional population of no more than 100 females is *de facto* extirpated due to the high likelihood that individuals would be too dispersed to form a cluster. Under northern spotted owl Issue 1, the BLM defined a cluster of northern spotted owls—the minimum size of a reproductively-stable population—as 20 to 25 breeding pairs that support each other demographically (*i.e.*, their territories overlap such that their offspring readily would encounter each other). The U.S. Fish and Wildlife Service also considers a regional population of no more than 100 female northern spotted owls to be *de facto* extirpated (Betsy Glenn, personal communication via phone to Eric Greenquist, 07/29/2014.)

Regarding how to portray extinction risk over time, Akcakaya (2000, p. 2) stated that such risk is communicated best by specifying the entire distribution of extinction time instead of calculating only the mean or median extinction time; i.e., by plotting a cumulative probability distribution that shows the probability of extinction at or before a specific time. "Thus, the result becomes (the distribution of) the time (e.g., number of years) until the population declines below a predetermined threshold" (Akcakaya 2000, p. 3, parentheses in original). Therefore, the BLM plotted a cumulative time to quasi-extinction curve, for each alternative, using the modeling region-specific quasi-extinction thresholds developed by the U.S. Fish and Wildlife Service (USDI FWS 2012, pp. 19-21 and 30-32). This allowed the BLM to compare its alternatives in terms of the number of years from present during which the simulated northern spotted owl population had a certain probability of persisting above these thresholds in each modeling region and range-wide. The BLM did not intend these to be actual forecasts of persistence but only estimates of the relative contribution of each alternative to northern spotted owl persistence.

Population Source Analyses

In this analysis, the BLM conducted a population source analysis to identify areas that produce northern spotted owls.

When habitat quality and spatial arrangement are weak predictors of population performance—as commonly is the case with the northern spotted owl, especially at regional or range-wide scales (e.g., Forsman *et al.* 2011, pp. 70-72)—complex source-sink dynamics are a likely cause (Schumaker *et al.* 2014, p. 589). Source-sink analyses not only can identify areas of the landscape where habitat conditions contribute to or inhibit northern spotted owl population recovery, but also can reveal how the alternatives would affect those sources and sinks.

Schumaker *et al.* (2014), using the HexSim model developed by the U.S. Fish and Wildlife Service, completed a source-sink analysis of the northern spotted owl in the United States-portion of its range. They found that "A majority of the modeling regions and the physiographic provinces functioned as demographic sinks," and "The northern portions of the NSO's [northern spotted owl's] range functioned as a blend of seemingly mild sinks and mediocre sources, due largely to low occupancy rates." Their findings concerned the BLM for two reasons:

- The BLM wanted to identify areas in the planning area that acted as sources and sinks, and their associations with BLM-administered land patterns and BLM proposed land use allocations (e.g., did the BLM delineate reserves on BLM-administered land to support demographic sources?). Thus, the appropriate scale for a source-sink analysis (Schumaker *et al.* used two scales: the modeling regions and the physiographic provinces) was too coarse for BLM needs.
- Aware of the downward trend in northern spotted owl populations through much of its range, the BLM did not feel that a source-sink analysis similar to that performed by Schumaker *et al.* would supplement its other analyses (e.g., if, as Schumaker *et al.* found, the source-sink results for the northern portion of the range were primarily the result of low occupancy rates, such information would not add to the information generated by the BLM population analyses).

After discussing its information needs with David LaPlante of Natural Resource Geospatial and Jeffery Dunk of Humboldt State University (personal communication via phone to Eric Greenquist, 08/19/2014), the BLM decided to deviate from a source-sink analysis in favor of a source analysis. As David LaPlante and Jeffrey Dunk explained, a source-sink analysis at the BLM's desired scale might generate misleading results because, in the BLM HexSim model, northern spotted owls seek areas with high relative habitat suitability values (see Schumaker *et al.* 2014, p. 582). If such localized areas, which presumably would be the richest sources of northern spotted owl production on BLM-administered lands, become occupied by dispersing owls in excess of their resource capabilities, some of those simulated owls "die," in effect reducing a local area's net source value and possibly turning it into a net sink. In contrast, a source analysis would be expected to reveal an area's ability to produce northern spotted owls at a scale that would inform BLM planning decisions.

To complete the analysis, the BLM ran 100 non-stochastic simulations and tabulated, by decade, the number of simulated northern spotted owls produced in each hexagon in the planning area (the hexagon's source value). The BLM then divided each hexagon into 30 × 30 m pixels and assigned its source value to each of the pixels. Finally, using each pixel as the center-point of a median provincial home range circle (**Table 3-261**), and using the pixel's location to determine which provincial home range circle area to assign, the BLM calculated the mean of the pixel values in the circle and assigned that value to the center pixel (mean source value). This generated, for each alternative, decadal maps of the mean source value across all lands in the planning area.

These maps allowed the BLM to identify demographic sources on the landscape and the relative value of each source, and to examine how demographic sources would develop at decadal increments during the next 50 years under each alternative. The protection and development of demographic sources is essential to species recovery. Finally, since the BLM manages habitat, as opposed to species, these outputs allowed the BLM to examine the relationship between the relative quantity of northern spotted owl nesting-roosting habitat in an area and the relative contribution of that area to northern spotted owl recovery, which provides insight into how the BLM might improve its delineations of reserve land use allocations.

Affected Environment and Environmental Effects

Population Change

Simulations of northern spotted owl population responses for the No Timber Harvest Reference Analysis indicate that the forested landscape managed by the BLM is capable of contributing to a range-wide northern spotted owl population that would decline from current levels but would stabilize within 50 years (**Table 3-264**). However, as shown in **Tables 3-265** and **3-266**, this range-wide stabilization would be due to a population increase in the California-portion of the range and to population stability in the Klamath and eastern Cascades regions of Oregon.[4] In other portions of the range, simulated populations would decline during the next 50 years.

Table 3-264. No Timber Harvest Reference Analysis: Northern spotted owl range-wide populations (mean of 500 replicate non-stochastic simulations) by year.

Populations	Simulation Year						
	2013	2023	2033	2043	2053	2063	2113
Number of Territorial Females	4,262	4,101	4,004	3,958	3,945	3,963	3,966
Number of All Females	5,476	5,238	5,102	5,043	5,022	5,045	5,050

Table 3-265. No Timber Harvest Reference Analysis: Simulated northern spotted owl populations (mean of 500 replicate non-stochastic simulations), by modeling region and year.

Modeling Region	Simulation Year						
	2013	2023	2033	2043	2053	2063	2113
West Cascades-North	28	24	23	22	21	20	16
East Cascades-North	355	340	331	327	322	321	296
North Coast and Olympic*	158	138	123	109	97	86	50
West Cascades-Central	159	146	138	131	126	122	110
West Cascades-South*	944	878	823	782	744	710	597
Oregon Coast*	231	177	136	105	81	67	33
East Cascades-South*	198	195	191	191	195	198	199
Klamath-Siskiyou-East*	697	676	666	663	666	668	675
Klamath-Siskiyou-West*	760	740	734	736	748	763	806
Redwood Coast	929	920	931	950	979	1,021	1,122
Inner California Coast	1,010	1,003	1,008	1,026	1,043	1,069	1,145

* Modeling regions entirely or partially in the planning area.

[4] However, as described in the next section, Population Risk, the forecast of population stability in the eastern Cascades of Oregon is unreliable.

Table 3-266. No Timber Harvest Reference Analysis: Simulated northern spotted owl populations (mean of 500 replicate non-stochastic simulations), by physiographic province and year.

Physiographic Province	Simulation Year						
	2013	**2023**	**2033**	**2043**	**2053**	**2063**	**2113**
Washington Eastern Cascades	206	192	182	175	167	164	148
Washington Western Cascades	179	164	155	147	141	136	120
Washington Western Lowlands	2	2	1	1	1	1	1
Washington Olympic Peninsula	141	124	111	98	88	79	46
Oregon Coast Range*	238	181	139	107	83	67	30
Oregon Willamette Valley*	2	2	1	1	1	1	1
Oregon Eastern Cascades*	260	258	257	263	269	275	262
Oregon Western Cascades*	1,251	1,171	1,104	1,049	1,005	965	845
Oregon Klamath*	717	696	688	699	713	726	756
California Cascades	89	89	87	87	89	92	105
California Klamath	1,414	1,398	1,401	1,417	1,435	1,463	1,552
California Coast Range	968	961	975	998	1,030	1,075	1,184

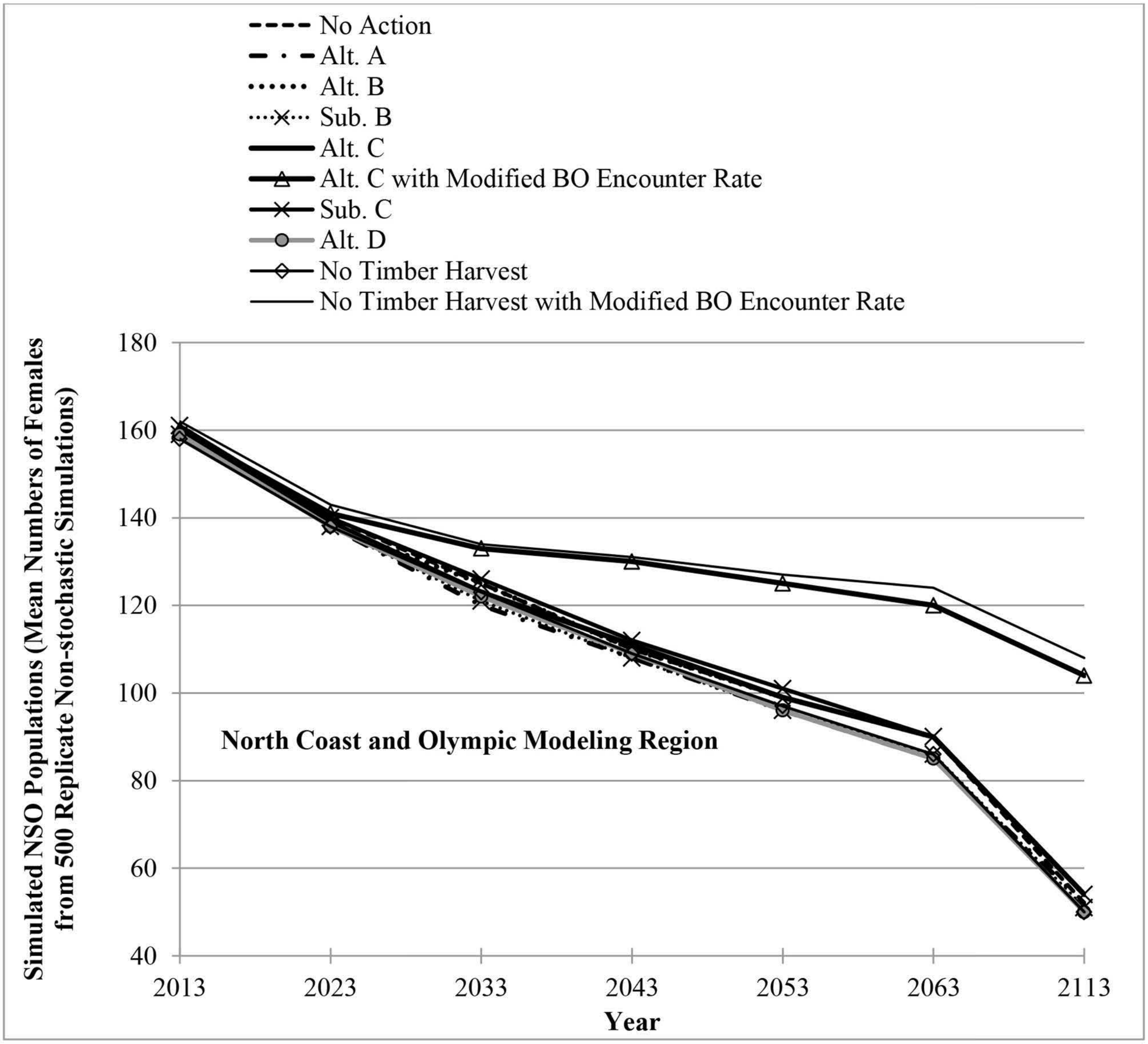
* Physiographic provinces entirely or partially in the planning area.

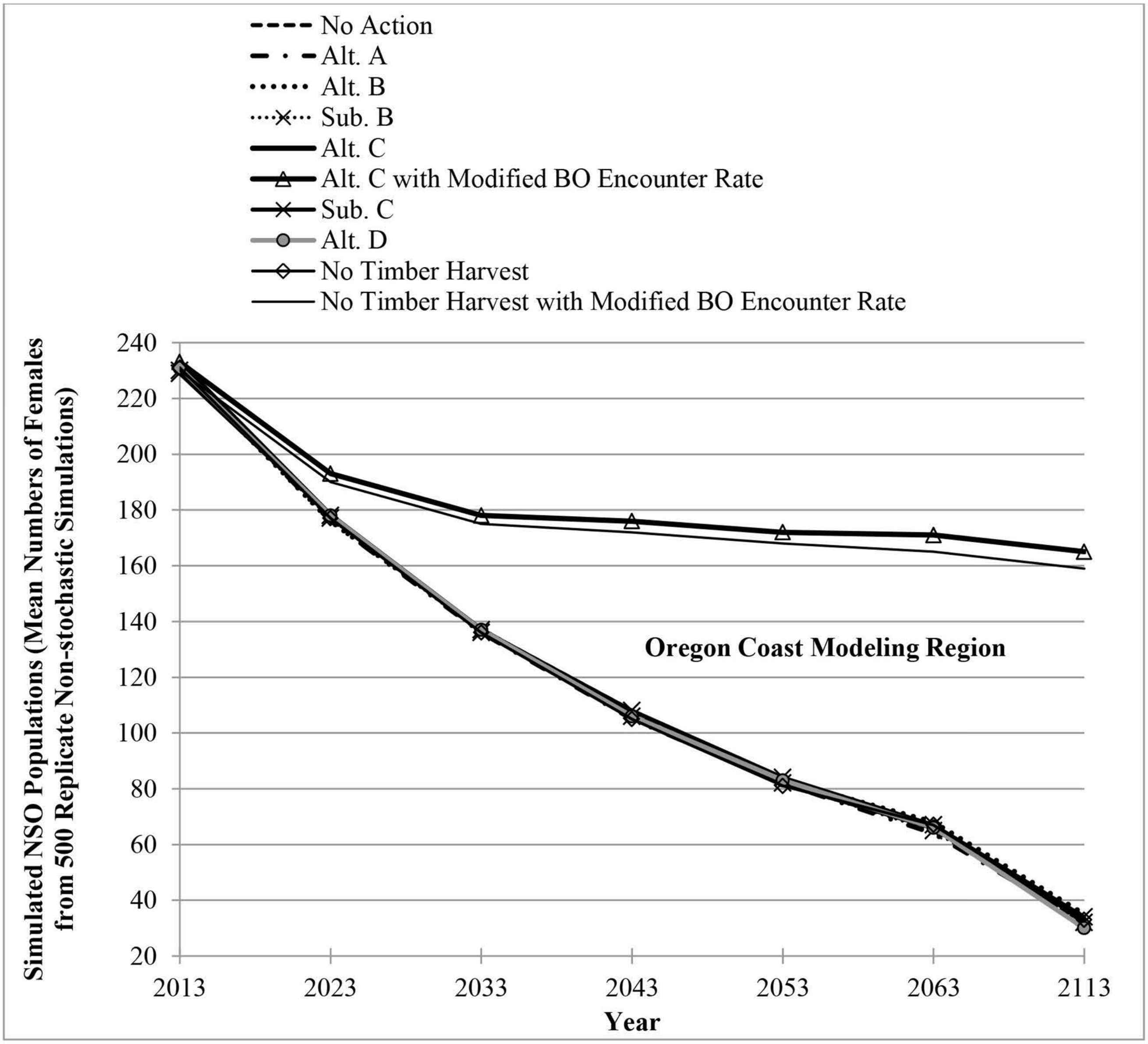
Figures 3-195 and **3-196** show forecasts of how northern spotted owl populations would change under each alternative, and according to the No Timber Harvest Reference Analysis using current barred owl encounter rates and the No Timber Harvest Reference Analysis and Alternative C with modified barred owl encounter rates. The graphs show, for each western Oregon modeling region (**Figure 3-195**) and each western Oregon physiographic province (**Figure 3-196**), changes in the mean number of females from 500 replicate, non-stochastic simulations. These forecasts are based on decadal changes in habitat suitability during 2013-2063, then habitat conditions held static at 2063 levels until 2113.

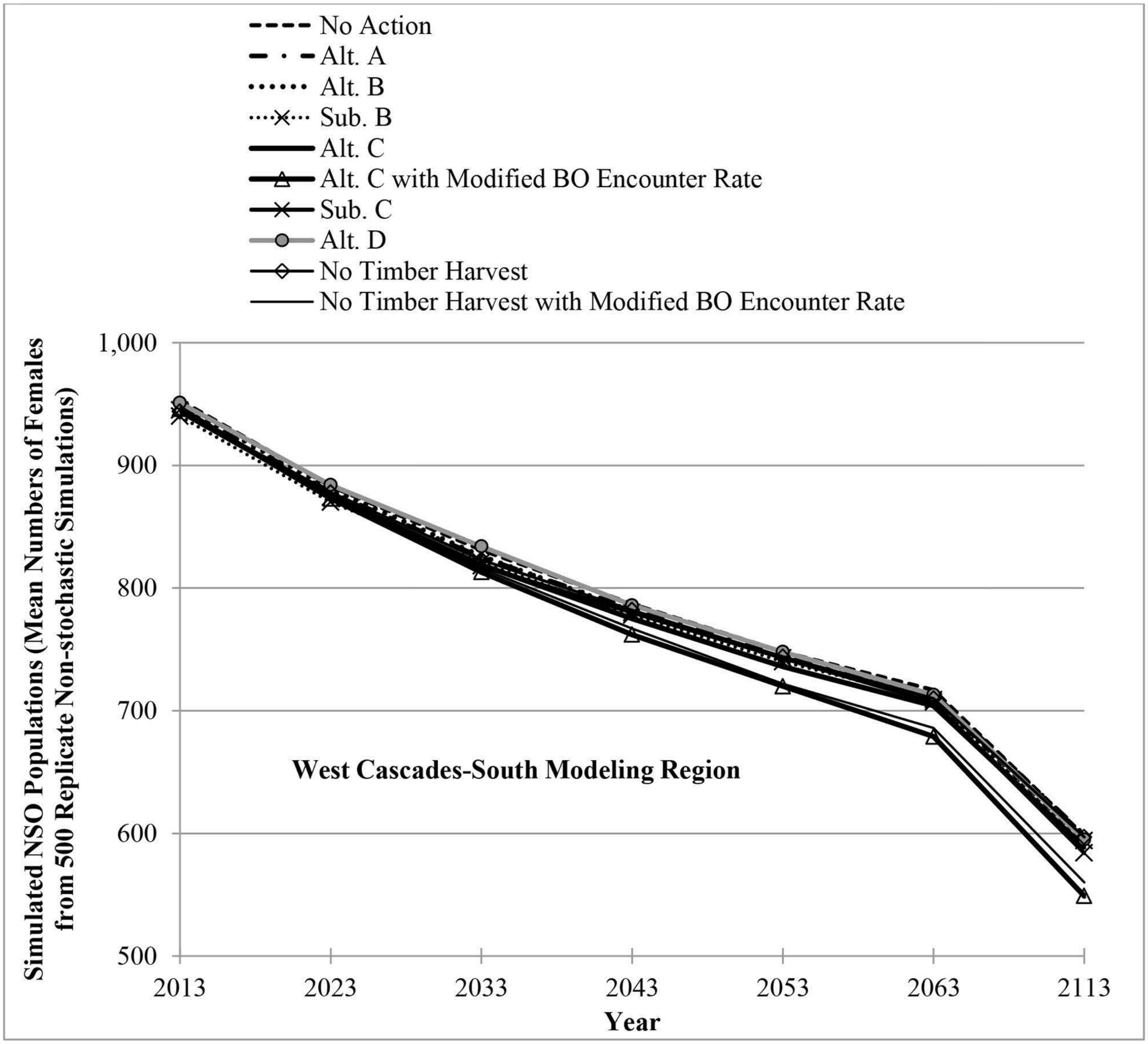
In general, there is little differentiation in northern spotted owl population responses among the alternatives and the No Timber Harvest Reference Analysis using current barred owl encounter rates. This indicates that northern spotted owl populations would not respond substantively to the different amounts and distributions of habitat provided by each alternative (i.e., the habitat provided by each alternative would not limit the population response). Instead, the effect of barred owl encounter rates on northern spotted owl survival would dominate all population responses.

Coast Range of Oregon

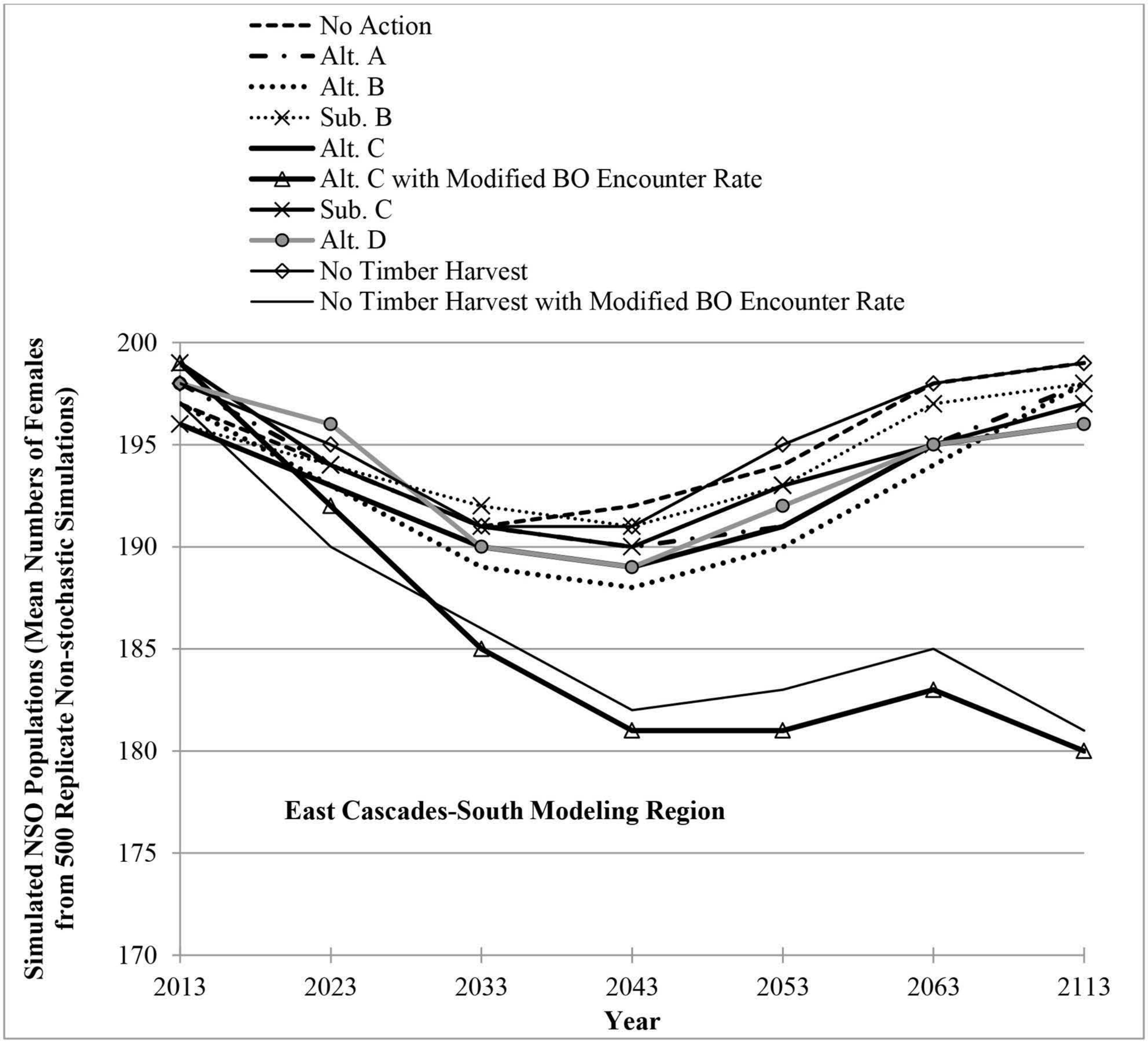
Population simulations for the North Coast and Olympic and the Oregon Coast modeling regions (**Figure 3-195**), and the Oregon Coast Range Physiographic Province (**Figure 3-196**), show negligible differences among the alternatives using current barred owl encounter rates. In the North Coast and Olympic Modeling Region, which includes the Olympic Peninsula of Washington (see **Figure 3-194**), the numbers of simulated females in 50 years would range from 85 to 90 (a decrease of 47 to 44 percent from the current population). Since BLM-administered lands comprise very little of this modeling region, these differences among the alternatives are products of statistical variations among the replicate simulations of each alternative. In the Oregon Coast Modeling Region, almost all of which occurs in the planning area, the numbers of simulated females in 50 years among the alternatives would range from 64 to 68 (a decrease of 71 percent). Simulations for the Oregon Coast Range Physiographic Province (**Figure 3-196**), which is confined to Oregon, show essentially identical results: the number of simulated females in 50 years among the alternatives would range from 64 to 70 (a decrease of 73 to 71 percent)

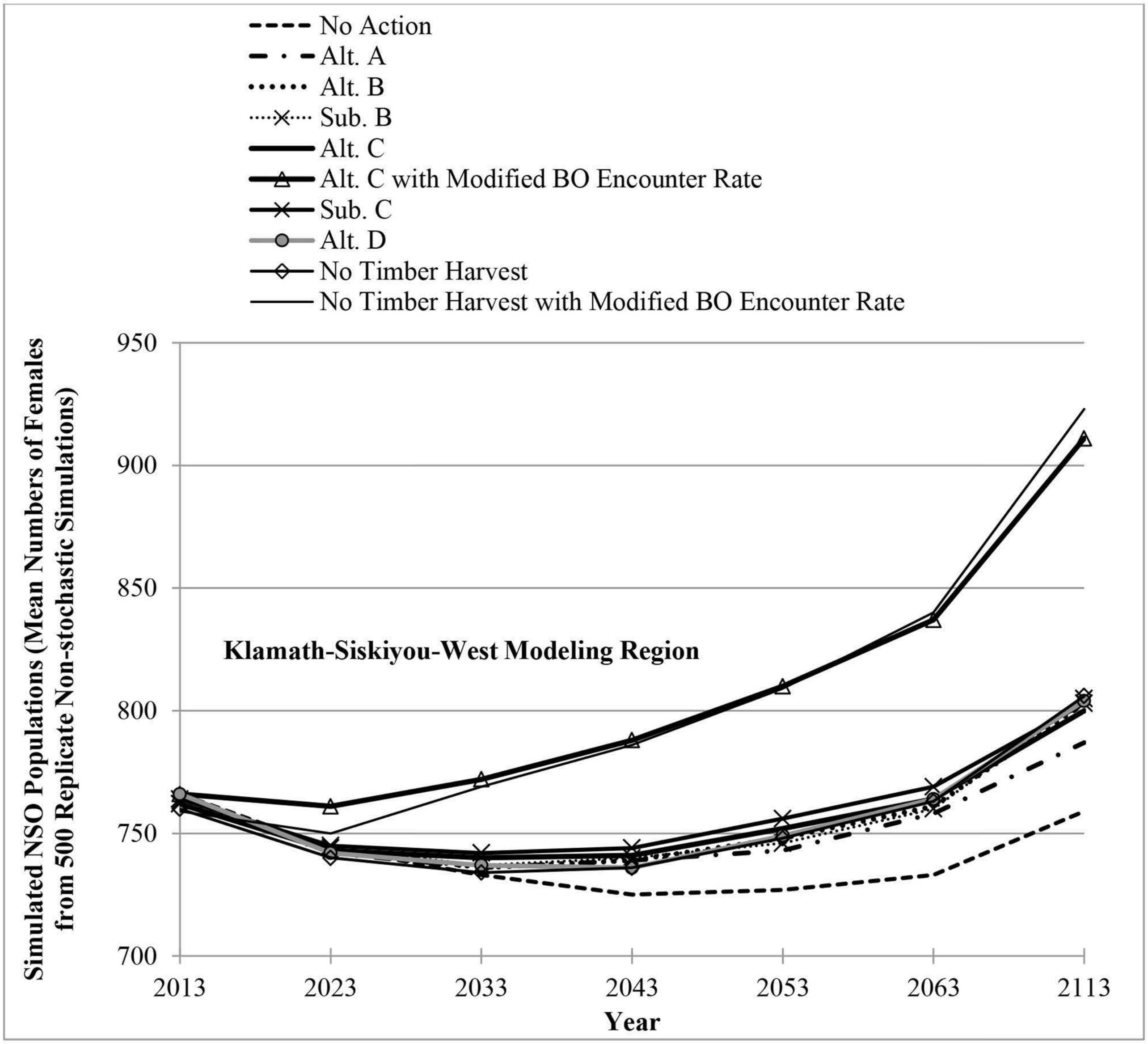

No Action
Alt. A
Alt. B
Sub. B
Alt. C
Alt. C with Modified BO Encounter Rate
Sub. C
Alt. D
No Timber Harvest
No Timber Harvest with Modified BO Encounter Rate
Simulated NSO Populations (Mean Numbers of Females from 500 Replicate Non-stochastic Simulations)
180
160
140
120
100
80
60
40
North Coast and Olympic Modeling Region
2013
2023
2033
2043
2053
2063
2113
Year


No Action
Alt. A
Alt. B
Sub. B
Alt. C
Alt. C with Modified BO Encounter Rate
Sub. C
Alt. D
No Timber Harvest
No Timber Harvest with Modified BO Encounter Rate
Simulated NSO Populations (Mean Numbers of Females from 500 Replicate Non-stochastic Simulations)
240
220
200
180
160
140
120
100
80
60
40
20
Oregon Coast Modeling Region
2013
2023
2033
2043
2053
2063
2113
Year



No Action
Alt. A
Alt. B
Sub. B
Alt. C
Alt. C with Modified BO Encounter Rate
Sub. C
Alt. D
No Timber Harvest
No Timber Harvest with Modified BO Encounter Rate
Simulated NSO Populations (Mean Numbers of Females from 500 Replicate Non-stochastic Simulations)
1,000
900
800
700
600
500
West Cascades-South Modeling Region
2013
2023
2033
2043
2053
2063
2113
Year


No Action
Alt. A
Alt. B
Sub. B
Alt. C
Alt. C with Modified BO Encounter Rate
Sub. C
Alt. D
No Timber Harvest
No Timber Harvest with Modified BO Encounter Rate
Simulated NSO Populations (Mean Numbers of Females from 500 Replicate Non-stochastic Simulations)
200
195
190
185
180
175
170
2013
2023
2033
2043
2053
2063
2113
Year
East Cascades-South Modeling Region


No Action
Alt. A
Alt. B
Sub. B
Alt. C
Alt. C with Modified BO Encounter Rate
Sub. C
Alt. D
No Timber Harvest
No Timber Harvest with Modified BO Encounter Rate
Simulated NSO Populations (Mean Numbers of Females from 500 Replicate Non-stochastic Simulations)
950
900
850
800
750
700
Klamath-Siskiyou-West Modeling Region
2013
2023
2033
2043
2053
2063
2113
Year

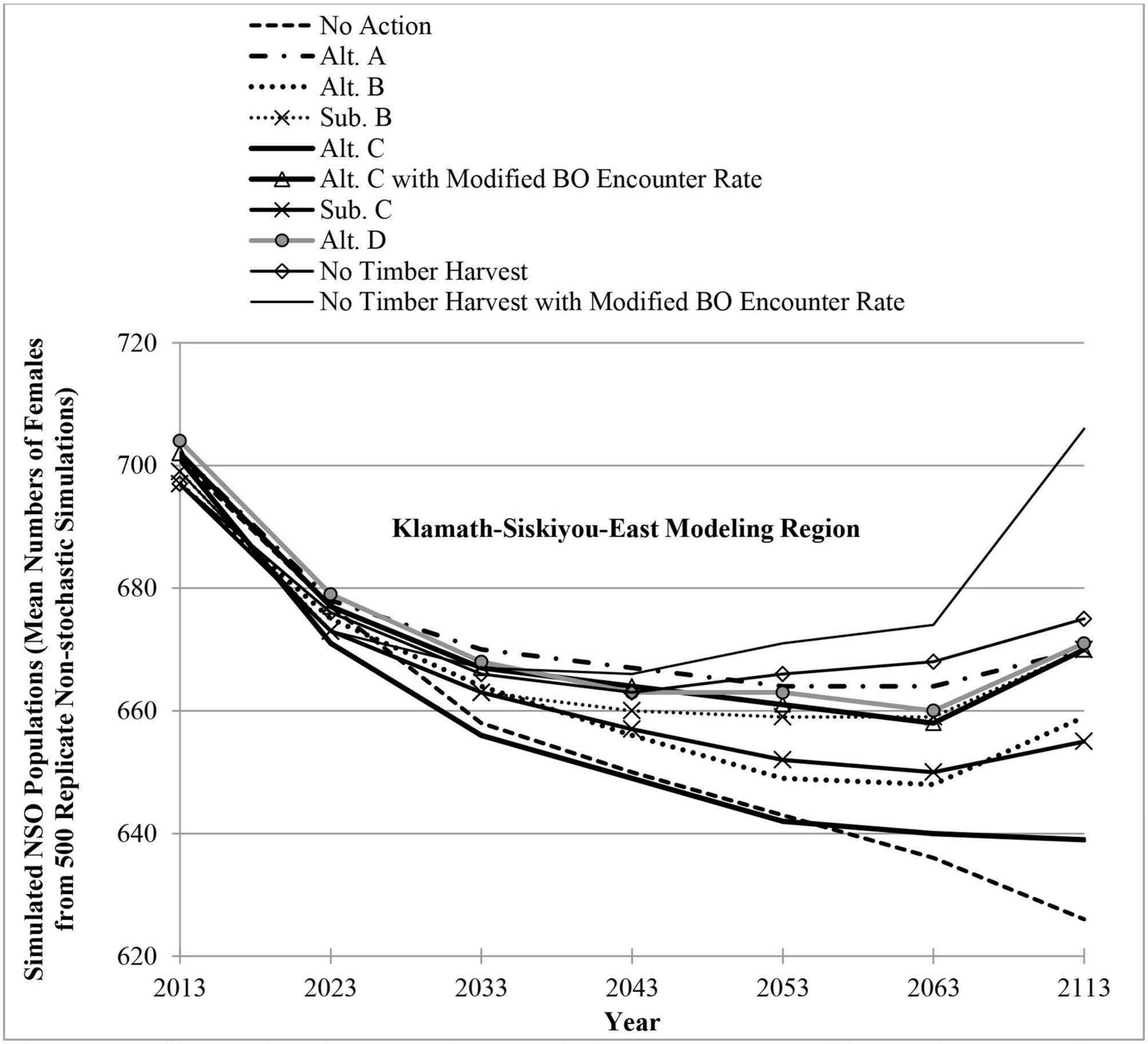
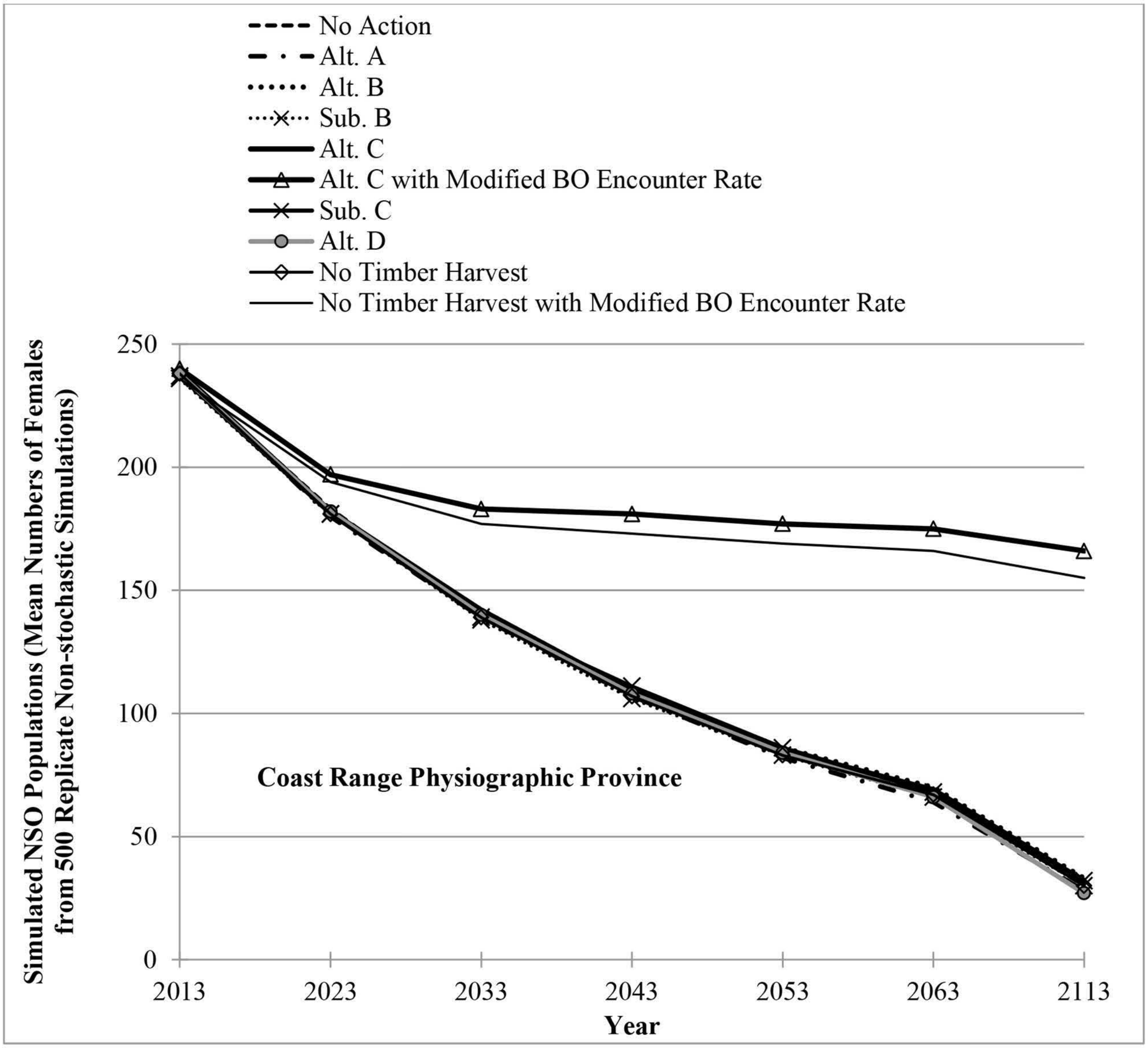
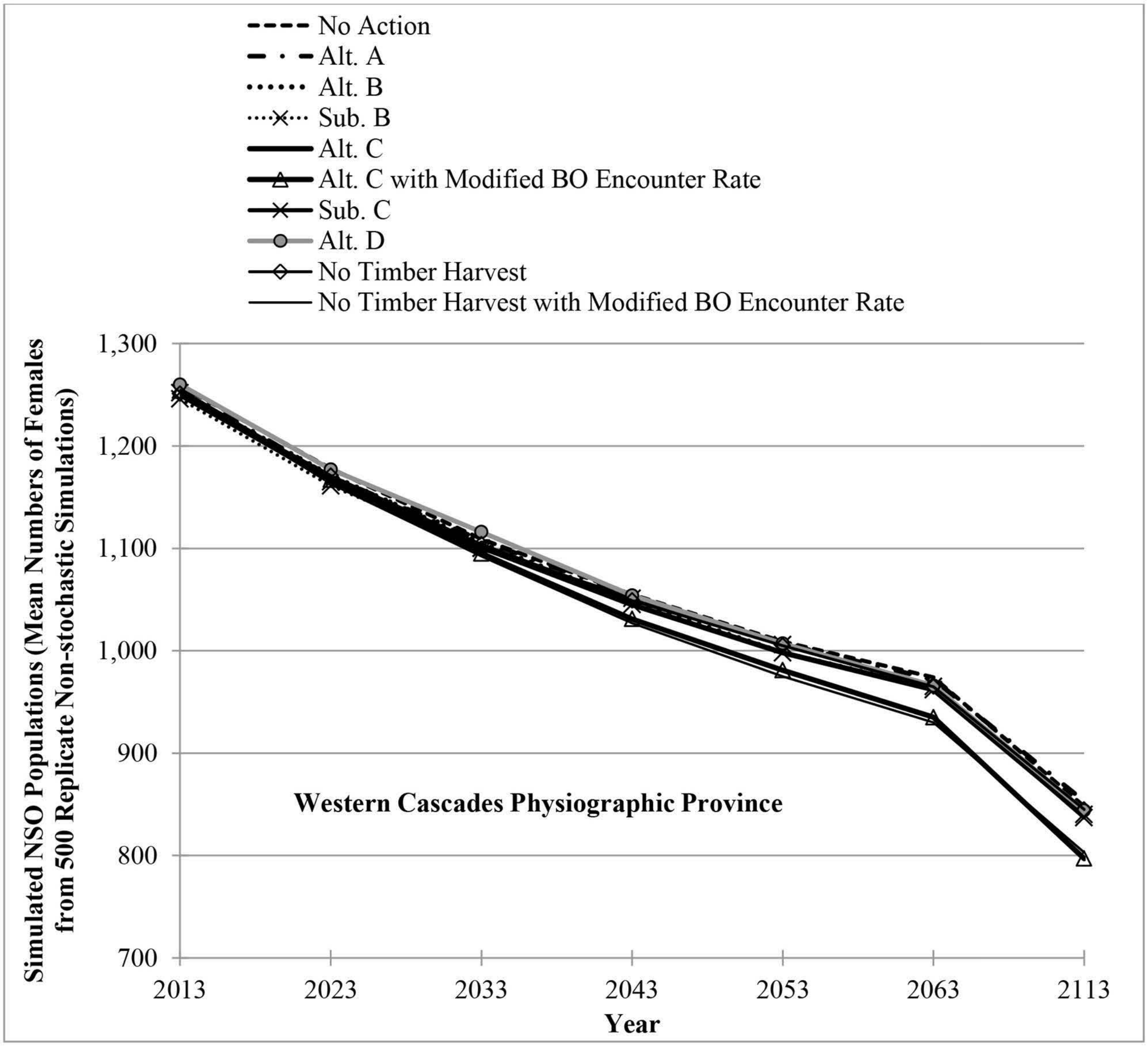
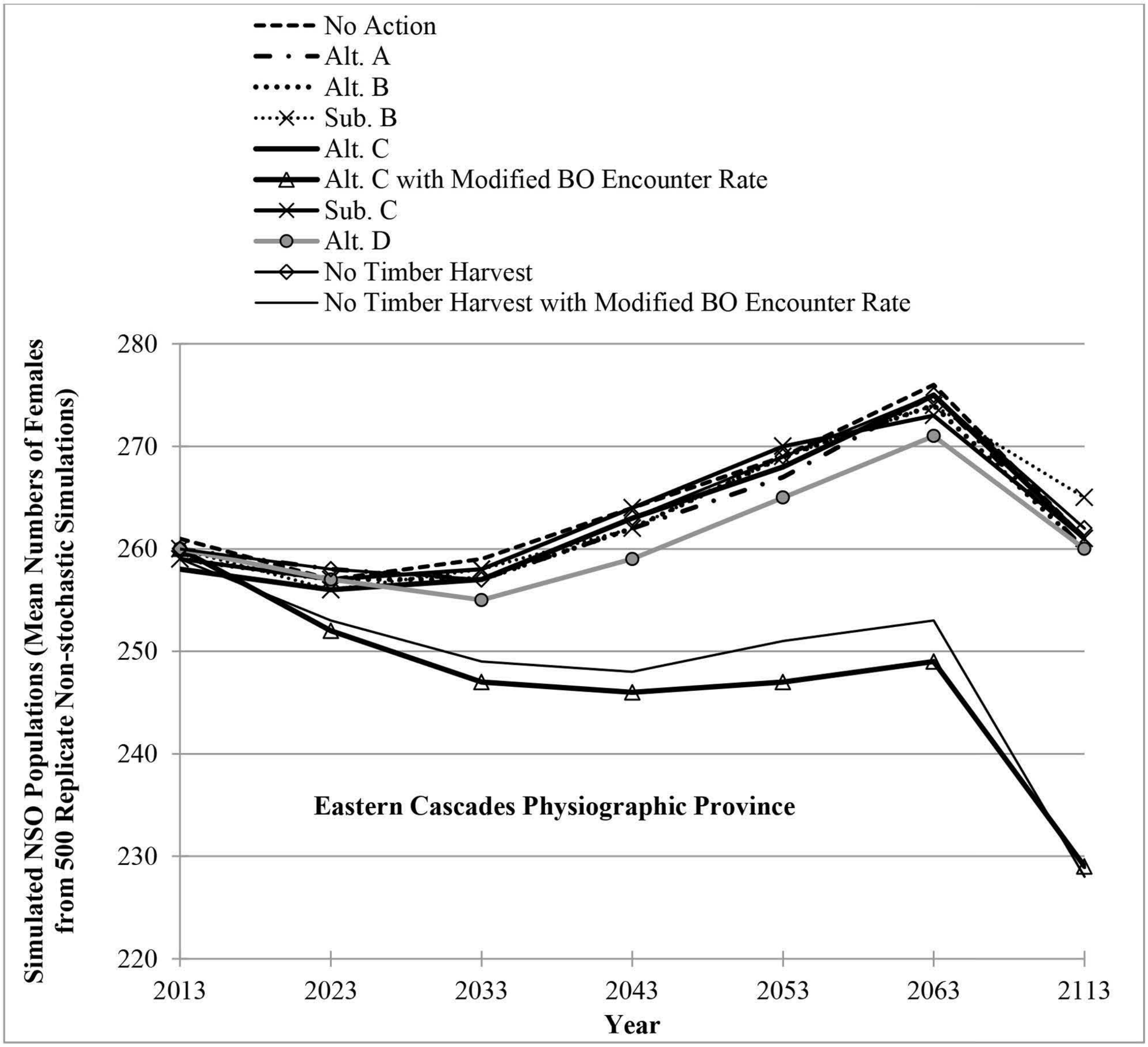


Figure 3-195. Simulated northern spotted owl populations (mean numbers of females from 500 replicate non-stochastic simulations) for each western Oregon modeling region, by alternative and year.
The No Timber Harvest and No Timber Harvest with Modified Barred Owl Encounter Rate Reference Analyses are included for comparison.


No Action
Alt. A
Alt. B
Sub. B
Alt. C
Alt. C with Modified BO Encounter Rate
Sub. C
Alt. D
No Timber Harvest
No Timber Harvest with Modified BO Encounter Rate
Simulated NSO Populations (Mean Numbers of Females from 500 Replicate Non-stochastic Simulations)
250
200
150
100
50
0
Coast Range Physiographic Province
2013
2023
2033
2043
2053
2063
2113
Year



No Action
Alt. A
Alt. B
Sub. B
Alt. C
Alt. C with Modified BO Encounter Rate
Sub. C
Alt. D
No Timber Harvest
No Timber Harvest with Modified BO Encounter Rate
Simulated NSO Populations (Mean Numbers of Females from 500 Replicate Non-stochastic Simulations)
1,300
1,200
1,100
1,000
900
800
700
Western Cascades Physiographic Province
2013
2023
2033
2043
2053
2063
2113
Year


No Action
Alt. A
Alt. B
Sub. B
Alt. C
Alt. C with Modified BO Encounter Rate
Sub. C
Alt. D
No Timber Harvest
No Timber Harvest with Modified BO Encounter Rate
Simulated NSO Populations (Mean Numbers of Females from 500 Replicate Non-stochastic Simulations)
280
270
260
250
240
230
220
Eastern Cascades Physiographic Province
2013
2023
2033
2043
2053
2063
2113
Year

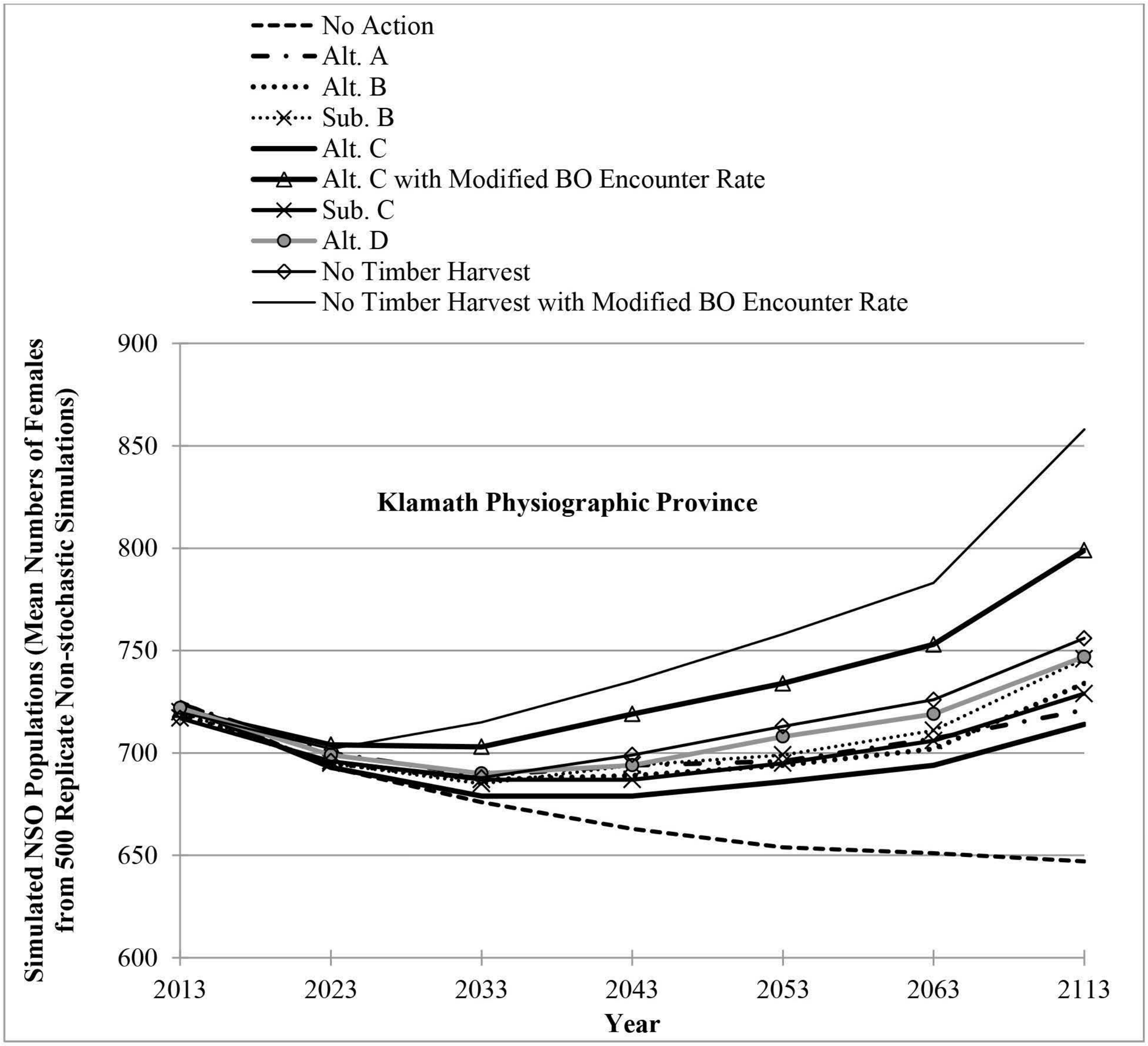


Figure 3-196. Simulated northern spotted owl populations (mean numbers of females from 500 replicate non-stochastic simulations) for each western Oregon physiographic province, by alternative and year. The No Timber Harvest and No Timber Harvest with Modified Barred Owl Encounter Rate Reference Analyses are included for comparison.

In this portion of the northern spotted owl range, differences in the habitat contributions under each alternative would have negligible effects on the northern spotted owl population response compared to factors that do not differ among the alternatives, such as starting habitat conditions, how those conditions change on non-BLM-administered lands, and the effect of barred owl encounter rates on northern spotted owl survival. **Figures 3-195** and **3-196** include simulations according to the No Timber Harvest reference analysis and under Alternative C, both with the modified barred owl encounter rates in **Table 3-263**). When compared to these two scenarios using current encounter rates, the outcomes illustrate (1) the substantive influence of the barred owl encounter rate on northern spotted owl population responses, (2) the lack of a substantive difference during the next 50 years between Alternative C and the No Harvest reference analysis. The northern spotted owl population response under the other alternatives with modified barred owl encounter rates would be substantially similar in magnitude and trend to the No

Timber Harvest reference analysis and Alternative C, based on the following three analytical conclusions from this analysis:

- the broad similarities among the alternatives in habitat development patterns
- the similarity in northern spotted owl population responses among all alternatives under current barred owl encounter rates
- the similarity in northern spotted owl population responses between the No Timber Harvest reference analysis and Alternative C under modified barred owl encounter rates

Simulations of population responses in the Oregon Coast Range Province with modified barred owl encounter rates (**Figure 3-196**) result in 175 northern spotted owls after 50 years under Alternative C but only 166 after 50 years according to the No Harvest reference analysis, a difference of 5 percent. However, 3 percent of that difference occurs during the first 20 years of simulation. In this specific case, this is not a substantive difference because there is substantial uncertainty about how fast northern spotted owls would respond to timber harvest and forest restoration under Alternative C. As such, there is uncertainty about whether Alternative C or any other alternative during the next 20 years would result in more northern spotted owls than under a No Timber Harvest reference scenario with modified barred owl encounter rates. **Figures 3-195** and **3-196** show mean values at decadal increments from 500 replicate non-stochastic simulations and must be interpreted with full understandings of data sources and analytical methods.

Western Cascades of Oregon

As shown in simulations for the West Cascades-South Modeling Region (**Figure 3-195**) and the Oregon Western Cascades Physiographic Province (**Figure 3-196**), the alternatives would have an equally-negligible influence on the northern spotted owl population response in this portion of the range. In the West Cascades-South Modeling Region, the numbers of simulated females in 50 years among the alternatives would range from 704 to 717 (a decrease of 26 to 24 percent from the current population). In the larger Oregon Western Cascades Physiographic Province, the numbers of simulated females in 50 years among the alternatives would range from 962 to 974 (a decrease of 23 to 22 percent).

In this portion of the range, the U.S. Fish and Wildlife Service suggested a future barred owl encounter rate that is slightly higher than the current rate (**Table 3-263**), the product of an anticipated increase in the barred owl population and the implementation of a barred owl control program. The No Timber Harvest reference analysis and Alternative C with modified barred owl encounter rates simulate this modified rate in **Figures 3-195** and **3-196**. Again, the forested landscape managed by the BLM is incapable of contributing to a stable northern spotted owl population in this portion of the range during the next 50 years.

Eastern Cascades of Oregon

Simulations for the East Cascades-South Modeling Region (**Figure 3-195**) and the Oregon Eastern Cascades Physiographic Province (**Figure 3-196**), forecast more-neutral population changes during the next 50 years. In the East Cascades-South Modeling Region, the numbers of simulated females in 50 years among the alternatives would range from 194 to 198 (a 2 percent decrease to a 1 percent increase from the current population). In the Eastern Cascades Physiographic Province (**Figure 3-196**), the numbers of simulated females in 50 years among the alternatives would range from 271 to 276 (an increase of 4 to 6 percent). The results are somewhat different because the East Cascades-South Modeling Region includes the southern portion of the eastern Cascades of Oregon and extends into California (**Figure 3-195**), whereas the more-northerly Oregon Eastern Cascades Physiographic Province includes the entire eastern Cascades of Oregon.

In the Eastern Cascades of Oregon, the U.S. Fish and Wildlife Service suggested a modified barred owl encounter rate that is greater than the current rate (see **Table 3-263**), the product of a possible increase in the barred owl population and the implementation of a barred owl control program. The No Timber Harvest reference analysis and Alternative C with modified barred owl encounter rates simulate this modified rate in **Figures 3-195** and **3-196**. In this portion of the range, the forested landscape managed by the BLM is capable of contributing to a stable northern spotted owl population within 50 years, but at levels that place this population at risk (see Population Risk, below).

Klamath Basin of Oregon

Simulations for the Klamath-Siskiyou-West and Klamath-Siskiyou-East modeling regions (**Figure 3-195**) and the Oregon Klamath Physiographic Province (**Figure 3-196**), show minor differences among the alternatives. In the Klamath-Siskiyou-West Modeling Region, the numbers of simulated females in 50 years among the alternatives would range from 733 to 769 (a 4 percent decrease to a 1 percent increase from the current population). In the Klamath-Siskiyou-East Modeling Region, the numbers of simulated females in 50 years among the alternatives would range from 636 to 664 (a decrease of 9 to 5 percent). In the Oregon Klamath Physiographic Province (**Figure 3-196**), the numbers of simulated females in 50 years among the alternatives would range from 651 to 719 (a decrease of 10 to 0 percent). Alternative D and Sub-alternative B would support northern spotted persistence better in this portion of the range, while the No Action alternative and Alternative C would provide the least support.

The No Timber Harvest reference analysis with both current and modified barred owl encounter rates indicate that the forested landscape managed by the BLM is capable of contributing to a stable and increasing northern spotted owl population in this portion of the range within 50 years (see **Figures 3-195** and **3-196**). Under Alternative C with modified barred owl encounter rates, the BLM would contribute to stable and increasing populations in the Klamath-Siskiyou-West Modeling Region and the Oregon Klamath Physiographic Province, but would not in the Klamath-Siskiyou-East Modeling Region. Nonetheless, simulations for the Klamath-Siskiyou-East Region indicate that habitat conditions on BLM-administered lands in 50 years would contribute to an increasing population during the subsequent 50 years

Population Risk

As shown in **Table 3-264**, at no time during the simulation for the No Timber Harvest Reference Analysis did the range-wide number of territorial females northern spotted owls decline to the quasi-extinction threshold of 1,250 females used by the U.S. Fish and Wildlife Service, suggesting that the forested landscape managed by the BLM in the planning area is capable of contributing to species persistence throughout the next 50 years. That said, **Figure 3-197** shows the probability, over time, of the simulated northern spotted owl population in each modeling region declining to 250 females—the quasi-threshold of a population at risk for extirpation—according to the No Timber Harvest Reference Analysis. There is at least an 88 percent probability that northern spotted owl populations in the North Coast and Olympic and East Cascades-South regions currently are below the 250-female threshold. There also is a 41 percent probability that the population in the Oregon Coast Region currently is below the 250-female threshold,[5] and the BLM has no opportunity to prevent that probability from increasing to75 percent in ten years.

[5] The northern spotted owl demographic data used in this analysis are at least 6-years-old, suggesting that this population currently is above the 50 percent threshold.

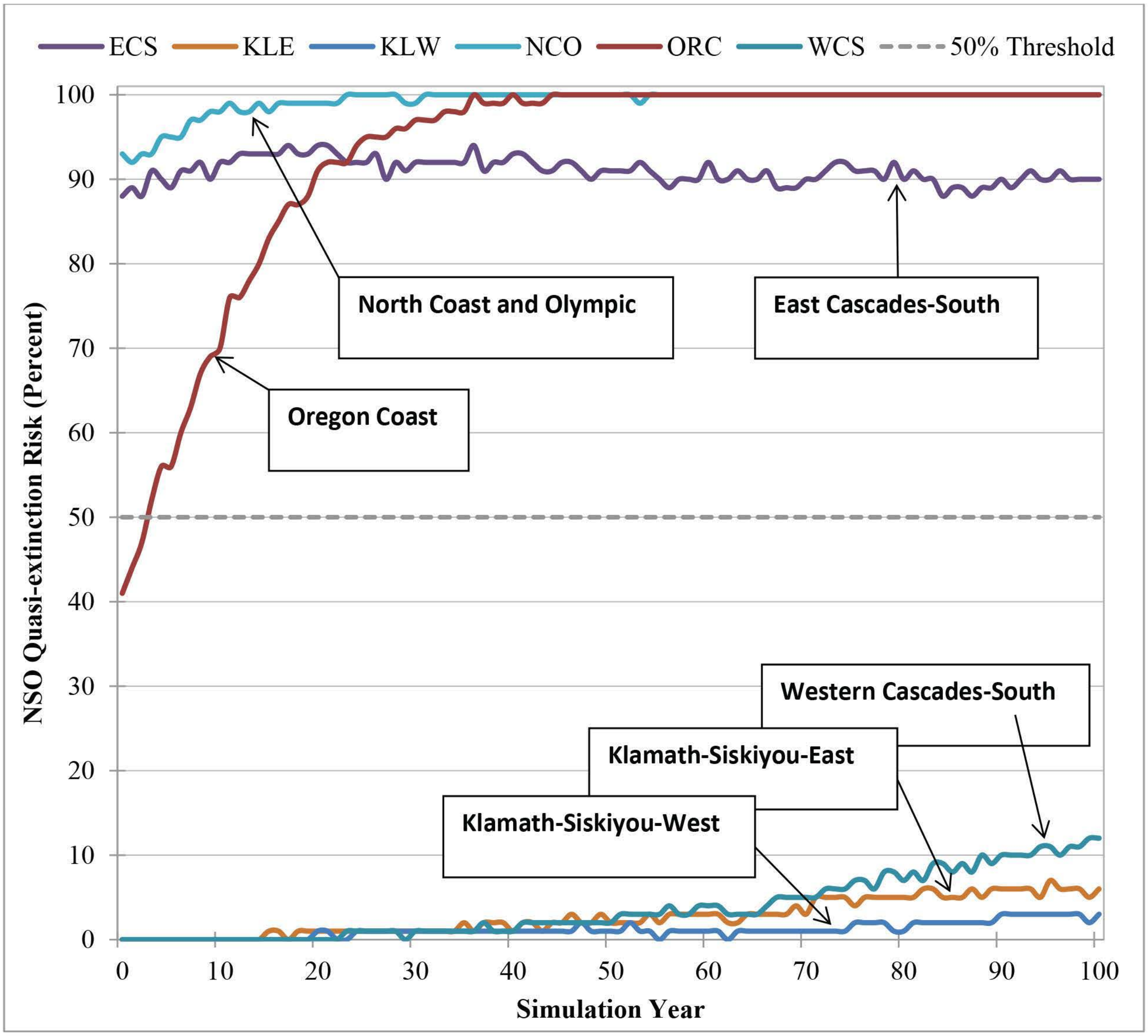


Figure 3-197. No Timber Harvest: extinction risk as a function of time, using a quasi-extinction level of 250 females in each modeling region.
This graph shows the mean probability, by year (0 = 2013), that 500 simulated stochastic populations in each of the western Oregon modeling regions decline to 250 females.

In the previous section, Population Change, the BLM reported that the eastern Cascades of Oregon is an area in which the landscape managed by the BLM is capable of contributing to a stable population. However, the risk analysis indicates that the current population in that region is so small that the BLM forecast of stability is unreliable. This population currently is threatened by small population processes and stochastic changes to the environment.

Within the Western Cascades-South, Klamath-Siskiyou-East and Klamath-Siskiyou-West modeling regions, **Figure 3-197** shows that the forested landscape managed by the BLM is capable of contributing to a landscape with no more than a 3 percent probability that a regional population would decline to 250 females at any time during the next 50 years.

Figure 3-198 shows the probability, over time, of the simulated northern spotted owl population of each modeling region declining to 100 females—the quasi-threshold of regional extirpation—according to the

No Timber Harvest Reference Analysis. Within the planning area, northern spotted owl populations in the North Coast and Olympic and Oregon Coast modeling regions reach a 50 percent probability of dropping below the 100-female threshold in 34 years, which increases in the Oregon Coast Region to a 79 percent probability in 50 years. However, in the other modeling regions in the planning area, the forested landscape managed by the BLM is capable of contributing to a landscape with no more than an 8 percent probability of a regional population dropping below the 100-female threshold during the next 50 years.

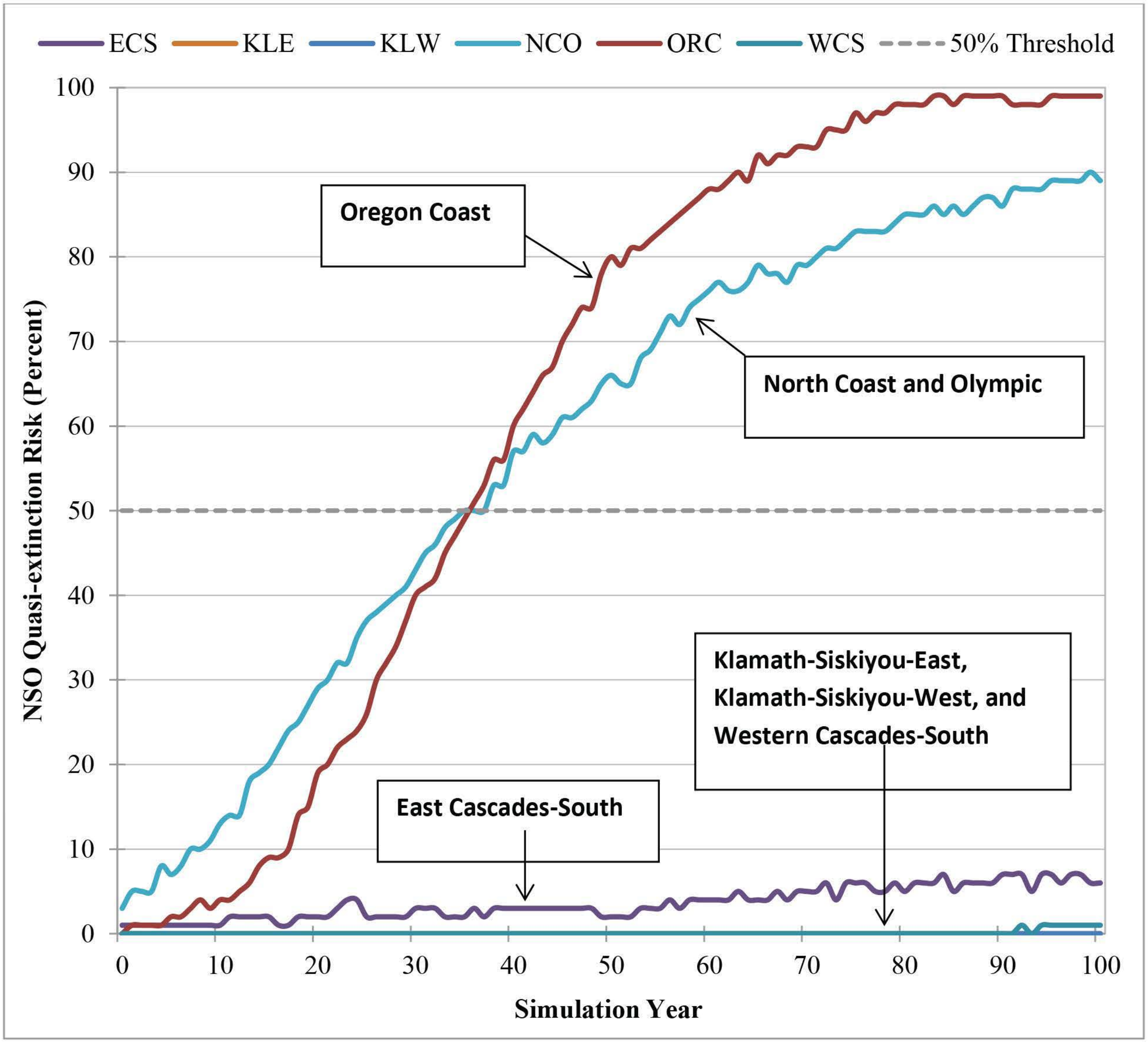


Figure 3-198. No Timber Harvest Reference Analysis: Extinction risk as a function of time, using a quasi-extinction level of 100 females in each modeling region.
This graph shows the mean probability, by year (0 = 2013), that 500 stochastic populations in each of the western Oregon modeling regions declined to 100 females.

These simulations indicate that the northern spotted owl currently is under significant biological stress, and at risk for extirpation, over much of the moist forest-portion of its range. In the Coast Range-portion of the planning area, the species already appears to be at risk for extirpation with only a 50 percent probability of persisting during the next 34 years, which drops to a 30 percent probability of persisting to 50 years. This population already appears to be vulnerable to small population processes and stochastic events which could unexpectedly cause its extirpation, and this vulnerability increases over time. So, the estimate that BLM-administered lands in the planning area are capable of contributing to species persistence in this area for 30 years should be interpreted with caution. The simulations also indicate that the BLM has no opportunity under current barred owl encounter rates to moderate this situation through the development of northern spotted owl habitat on BLM-administered lands.

Effects of the Alternatives

Appendix S shows the effects of the alternatives on northern spotted owl population risk, as well as the potential effects of modifying barred owl encounter rates as simulated by the No Timber Harvest Reference Analysis with modified barred owl encounter rates.

In the North Coast and Olympic Modeling Region (**Appendix S-C**, **Figures S-19 – S-20** and **Table S-4**), the alternatives would not substantively affect the year when the northern spotted owl population would have a 50 percent probability of declining to 250 females (population risk) or 100 females (regional extirpation). This population currently has more than a 90 percent probability of being at risk and that probability does not decrease over time under any alternative. In addition, lowering the barred owl encounter rate to the level modeled by the U.S. Fish and Wildlife Service does not lower the risk to this regional population. With respect to extirpation risk, under the alternatives this regional population would reach a 50 percent probability of extirpation in 33 to 38 years (**Appendix S-C**, **Figure S-19** and **Table S-4**). However, with the reduced barred owl encounter rate, the population does not reach the 50 percent probability during the next 50 years, a substantial improvement (**Appendix S-C**, and **Figure S-20**).

The findings for the Oregon Coast Modeling Region (**Appendix S-C**, **Figures S-21 – S-24** and **Tables S-5** and **S-6**) are almost identical: the alternatives would not substantively affect the year when the northern spotted owl population would have a 50 percent probability of declining to 250 females (**Appendix S-C**, **Figure S-23**) or 100 females (**Appendix S-C**, **Figure S-23**). Under all alternatives, this regional population would reach a 50 percent probability of being at risk for extirpation in 2 to 3 years, and that probability would increase to 80 percent within 20 years (**Appendix S-C**, **Figure S-21** and **Table S-5**). In addition, lowering the barred owl encounter rate to the level modeled by the U.S. Fish and Wildlife Service would not substantively lower the risk to this regional during the next 20 years (**Appendix S-C**, **Figure S-22**, and **Table S-5**). However, under the alternatives, the population would have a 100 percent probability of declining to 250 females within 40 years whereas reducing the barred owl encounter rate would keep that probability below 90 percent indefinitely (**Appendix S-C**, **Figures S-21** and **S-22**). With respect to extirpation risk, under the alternatives, this regional population would reach a 50-percent probability of extirpation in 33 to 36 years. However, with the reduced barred owl encounter rate, the population would remain below a 30 percent probability for extirpation during the next 50 years, a substantial improvement (**Appendix S-C, Figure S-24**, and **Table S-6**).

The findings for the West Cascades-South Modeling Region (**Appendix S**-C) are substantially better. In this portion of the range, the northern spotted owl population would have less than a 5 percent probability of declining to 250 females, and no discernable probability of declining to 100 females, during the next 50 years. Raising the barred owl encounter rate to the level suggested by the U.S. Fish and Wildlife Service would not affect those outcomes. There are no discernable differences among the alternatives during the next 50 years.

In the East Cascades-South Modeling Region, there is an 88 percent probability that the current population does not exceed 250 females, and the effects of the alternatives on that probability during the next 50 years are negligible (**Appendix S-C**). However, under all alternatives, the probability of the population declining to 100 females during the next 50 years does not exceed 5 percent. Raising the barred owl encounter rate to the level modeled by the U.S. Fish and Wildlife Service would have a negligible effect on those outcomes.

Results for the Klamath-Siskiyou-West and Klamath-Siskiyou-East modeling regions (**Appendix S-C**) are similar to those for the East Cascades-South Modeling Region. There are no discernable differences among the alternatives.

These results indicate that regional risks to the northern spotted owl population are predominately a function of barred owl encounter rates. This conclusion generally is consistent with the results of the U.S. Fish and Wildlife Service modeling in support of its designation of critical habitat (USDI FWS 2012). Differences among the alternatives in their contributions to northern spotted owl habitat have no discernable effect on risks to the northern spotted owl population.

Population Sources

Figures 3-199 shows potential northern spotted owl mean source values in the planning area during, 2013 – 2023 and 2053 – 2063, according to the No Timber Harvest Reference Analysis. The results for all five decades are tabulated in **Table 3-267** and **Figure 3-200**. **Figure 3-201** is identical to **Figure 3-199 A** except that **Figure 3-201** includes a delineation of BLM-administered lands.

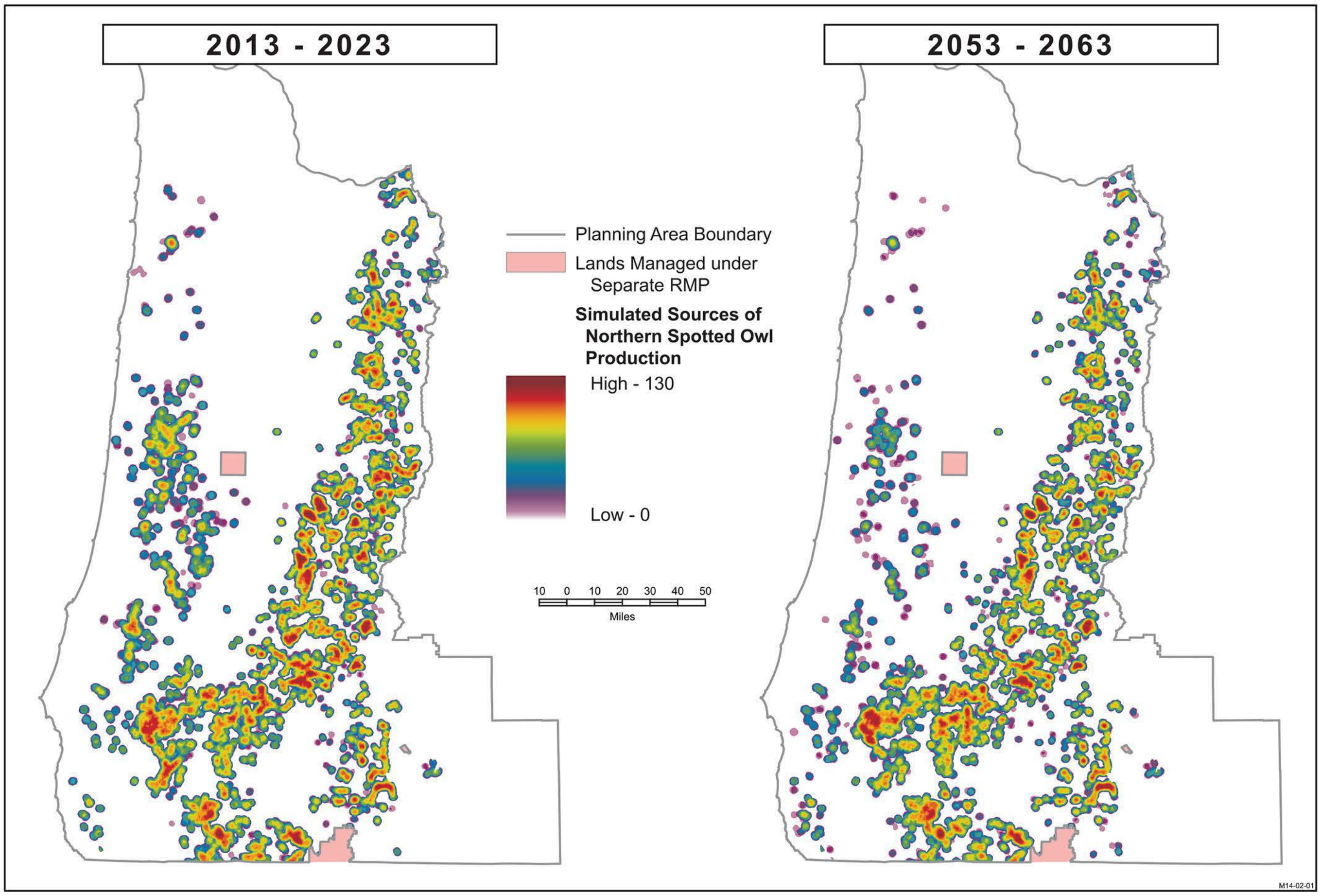


Figure 3-199. No Timber Harvest Reference Analysis: Simulated sources of northern spotted owl production during 2013-2023 (A) and 2053-2063 (B).
Colors reflect 1-130 births per hexagon (mean source value) during 100 replicate simulations.

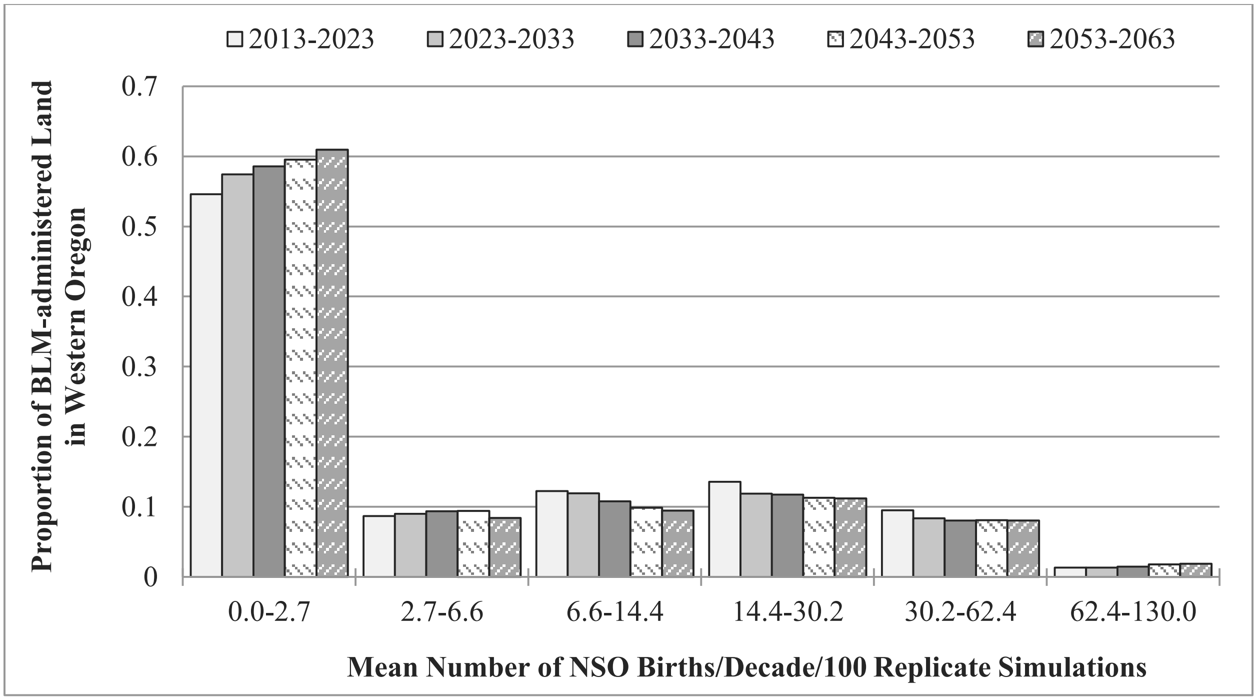


Figure 3-200. A comparison of the acres of BLM-administered land in western Oregon, during each decade, in each of six resource bins.

The bins are defined by the mean number of northern spotted owl births per decade during 100 replicate simulations.

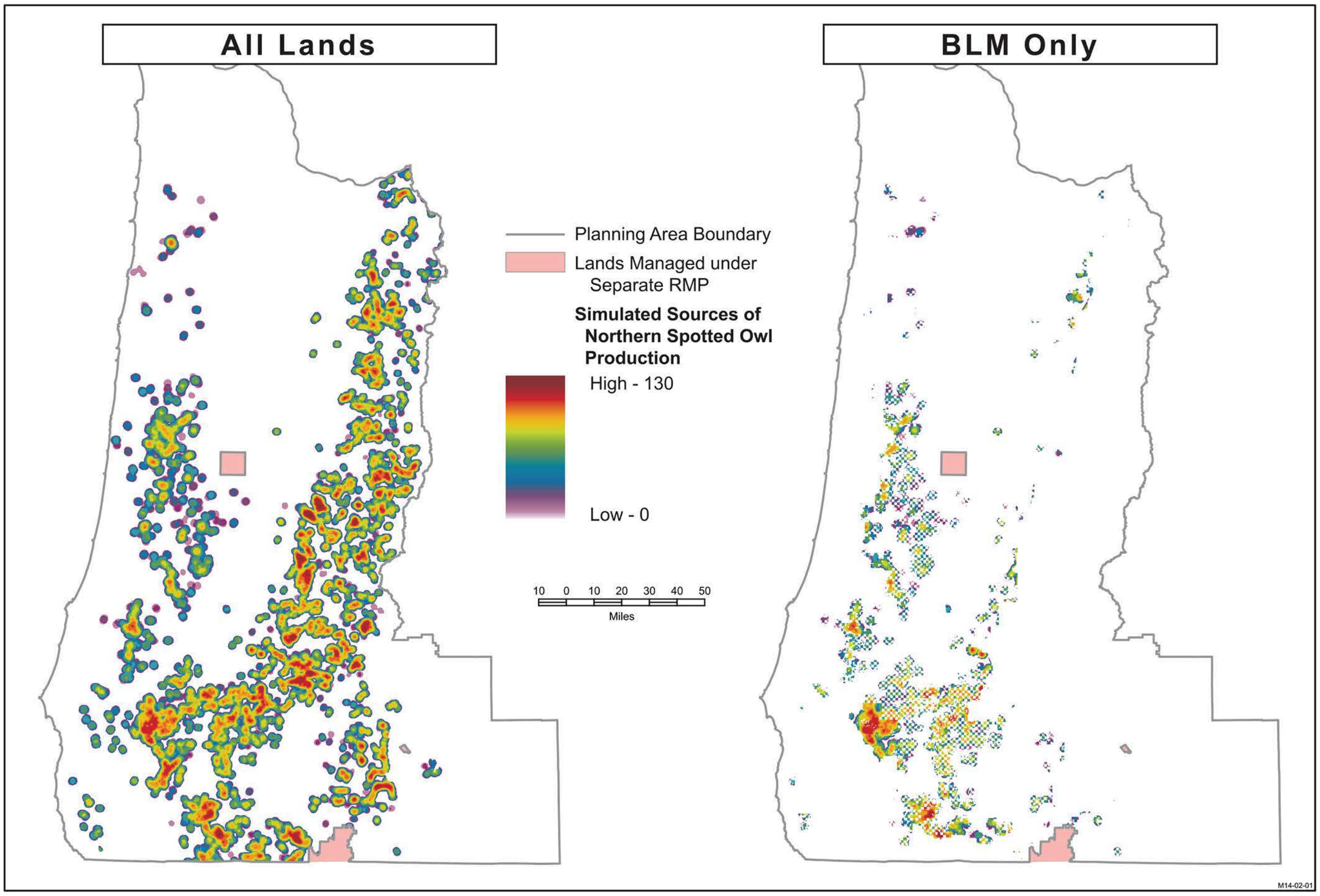


Figure 3-201. No Timber Harvest Reference Analysis: Simulated sources of northern spotted owl production during 2013-2023.
Colors reflect 1-130 births per hexagon (mean source value) during 100 replicate simulations.

Table 3-267. No Timber Harvest Reference Analysis: acres of BLM-administered land in the planning area in northern spotted owl mean source value bins.

Mean Number of Simulated Births/Decade/100 Replicate Simulations	Decade				
	2013-2023	2023-2033	2033-2043	2043-2053	2053-2063
0 – 2.7	1,263,900	1,329,800	1,356,000	1,378,300	1,411,300
2.7 – 6.6	201,400	208,800	216,600	218,000	195,100
6.6 – 14.4	283,200	276,200	250,000	228,400	218,700
14.4 – 30.2	314,600	275,500	272,500	261,300	259,800
30.2 – 62.4	220,600	194,200	186,100	187,700	186,600
62.4 – 130	31,400	30,800	33,900	41,400	43,500

Table 3-267 and **Figure 3-200** show that, during each decade, about 90 percent of northern spotted owl births on BLM-administered lands in the planning area, 30.2 to 130 births per decade, would occur on about 10 percent of those lands. During any decade, over 50 percent of the BLM landscape is capable of supporting no more than three births per decade. In addition, the acres of BLM-administered lands with the highest mean source values would decline each decade, except those with the highest productivity, those lands supporting 62.4 to 130 births per decade. Highest productivity lands are capable of increasing by 39 percent, from 31,400 acres to 43,500 acres, during the next 50 years. These results are heavily influenced by simulated declines in northern spotted owl populations in the planning area; fewer owls on the landscape progressively suppress mean source values. But these results also illustrate the potential value of the source analysis in informing the delineation of reserve land use allocations on BLM-administered lands.

As shown by comparing **Figures 3-199 A** and **3-201**, BLM-administered lands currently contribute substantively to northern spotted owl productivity in the Oregon Coast Range and Oregon Klamath provinces, but make only modest contributions in the Oregon Western Cascades Province. As simulated northern spotted owl populations decline over time in the planning area, their relative productivities also decline, as can be seen by comparing **Figures 3-199**. But a comparison of **Figure 3-199 A** with the locations of BLM-administered lands, shown in **Figure 3-201**, indicates that the forested landscape managed by the BLM is capable of making substantive contributions to northern spotted owl productivity in the Oregon Coast Range and Oregon Klamath provinces during the next 50 years.

Appendix S-D shows simulated sources of northern spotted owl production during 2053 – 2063, based on 100 replicate, non-stochastic simulations, under each alternative and according to No Timber Harvest Reference Analysis with modified barred owl encounter rates. The result for each alternative is similar to that for the No Timber Harvest Reference Analysis (**Figure 3-199 B**), reflecting a general decrease in production between 2013 and 2063 due to the decline in the northern spotted owl population. In addition, all alternatives yield results that are similar to those for the No Timber Harvest Reference Analysis, indicating that none of the alternatives appreciably would alter mean source values across the landscape or limit northern spotted owl production in any part of the planning area.

Issue 5

In accordance with Recovery Action 6, would the alternatives delineate at least one reserved land use allocation in the moist forest and, within that allocation, implement silvicultural techniques in plantations, overstocked stands and modified younger stands that would benefit the northern spotted owl?

Summary of Analytical Methods

To evaluate Recovery Action 6, the BLM quantified the progression of non-habitat, a surrogate for "plantations, overstocked stands and modified younger stands," to northern spotted owl habitat on BLM-administered lands in the moist forest of the planning area, in both reserved land use allocations and critical habitat units. In this context, "non-habitat" is statistically shown to be avoided by northern spotted owls (i.e., "strongly-selected-against" habitat, as defined in **Appendix S**).

Recovery Action 6 states, "In moist forests managed for spotted owl habitat, land managers should implement silvicultural techniques in plantations, overstocked stands and modified younger stands to accelerate the development of structural complexity and biological diversity that will benefit spotted owl recovery" (USDI FWS 2011a, p. III-19). The Recovery Action 6 narrative states that such activities "should be carried out in all Federal land classifications consistent with the NWFP [Northwest Forest Plan] Standards and Guidelines." The BLM initially interpreted "moist forests managed for spotted owl habitat" to refer only to reserve land use allocations in the alternatives. However, the U.S. Fish and Wildlife Service stated that Recovery Action 6 also addresses management within northern spotted owl critical habitat in the moist forests, even where critical habitat overlays the Harvest Land Base (Brendan White, U.S. Fish and Wildlife Service, verbal personal communication to Eric Greenquist, 09/24/2013).

Based on this input from the U.S. Fish and Wildlife Service, the BLM refined this issue to evaluate whether the BLM, under each alternative, would designate a reserve land use allocation in the moist forest for northern spotted owl recovery, and, within that reserve allocation and within designated critical habitat in the moist forest, implement appropriate silvicultural techniques in plantations, overstocked stands and modified younger stands. However, neither Recovery Action 6 nor the associated narrative recommends an analytical threshold, such as the quantity of forest treated, for the BLM to evaluate the consistency of the alternatives with Recovery Action 6. Lacking such a threshold, evaluating how the BLM would manage "plantations, overstocked stands and modified younger stands" in reserves and critical habitat under each alternative would reveal nothing more, with respect to BLM contributions to overall northern spotted owl recovery, than the analyses to address Conservation Needs 1 – 4, especially since the treatment of such stands under each alternative is incorporated into the northern spotted owl relative habitat suitability surfaces that the BLM uses to evaluate Conservation Needs 1 – 4.

In summary, each alternative includes reserve land use allocations in the moist forest that would be managed for structural complexity and biological diversity beneficial to the northern spotted owl (albeit, in different amounts and spatial arrangements). Each alternative includes all or a portion of designated critical habitat in the moist forest within the reserve land use allocations. Each alternative includes direction to implement silviculture techniques in plantations, overstocked stands, and modified younger stands to benefit northern spotted owl recovery. Since Recovery Action 6 recommends no threshold for the BLM to evaluate the alternatives, the BLM needs no additional analysis to determine that each of the alternatives would be consistent with Recovery Action 6. However, the alternatives differ in the amount of habitat change within reserve land use allocations and critical habitat in the moist forest. Therefore, the BLM tabulates in this analysis the changes in the acres of non-habitat for each alternative for reserve land use allocations and critical habitat in the moist forest.

Affected Environment and Environmental Effects

Table 3-268 shows the current acres of non-habitat (i.e., habitat strongly avoided by northern spotted owls) and the potential change in those acres according to the No Timber Harvest Reference Analysis. Since the No Timber Harvest Reference Analysis does not rely on land use allocations, the acres are confined to moist forest BLM-administered lands of the planning area in: 1) Northwest Forest Plan reserve land use allocations[110] ; and 2) northern spotted owl critical habitat.

[110] Since Recovery Action 6 refers to "moist forests managed for spotted owl habitat," the analyses include Riparian Reserves interspersed with Late-Successional Reserves, but exclude Riparian Reserves interspersed with other land use allocations.

Table 3-268. No Timber Harvest Reference Analysis: Acres of habitat strongly avoided by the northern spotted owl in moist forest land use allocations reserved under the Northwest Forest Plan, and in moist forest critical habitat units, on BLM-administered lands in the planning area.

Moist Forest BLM-administered Habitat Strongly Avoided	Year (Acres)					
	2013	2023	2033	2043	2053	2063
Reserved Lands	27,900	26,700	23,900	20,500	20,400	21,500
Critical Habitat Units	48,400	43,200	35,300	30,400	29,400	30,200

According to the No Timber Harvest Reference Analysis, the acres of non-habitat in the moist forest portion of both Northwest Forest Plan reserve land use allocations and northern spotted owl critical habitat units would be capable of decreasing each decade through 2053 as a result of forest growth, but then would increase slightly by 2063. This late increase is due to the simulated effects of wildfire, which are incorporated into the modeling of the No Timber Harvest Reference Analysis.

Figure 3-202 shows how the acres of non-habitat in moist forest reserve land use allocations would change over time (i.e., would transition to northern spotted owl habitat) under each alternative. Because the alternatives reserve different lands, the acres of non-habitat are not directly comparable among alternatives.

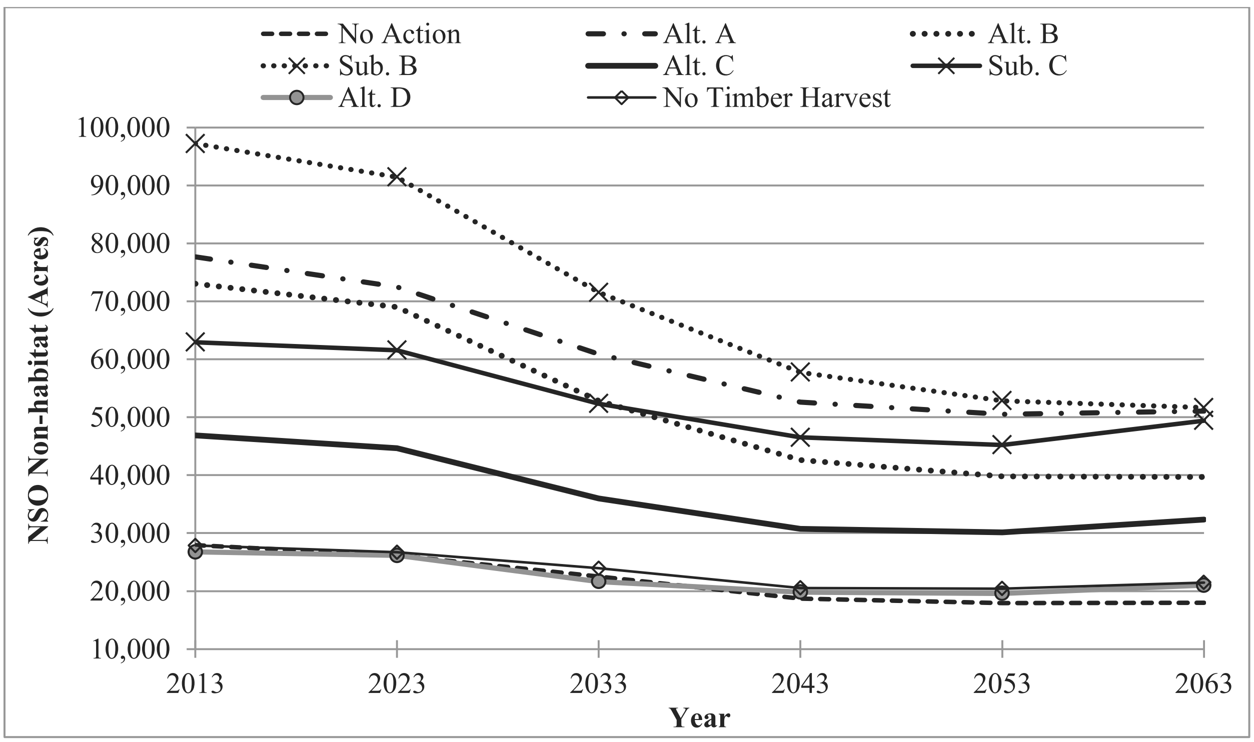


Figure 3-202. Forecasted change, by alternative, in the acres of the forested landscape that would be strongly avoided by northern spotted owls (i.e., non-habitat) of reserved land use allocations.
The No Timber Harvest Reference Analysis is included for comparison.

Under Alternative B and Sub-alternative B, the net acres of moist forest reserve non-habitat would decrease, respectively, by 46 and 47 percent during 50 years, resulting in net increases of, respectively, 33,300 and 45,600 acres of northern spotted owl habitat. These are followed by the No Action alternative and Alternative A which, respectively, would cause 36 and 34 percent decreases, corresponding to net increases of, respectively, 10,000 and 26,700 acres of habitat. Alternative C and Sub-alternative C would show 31 and 21 percent decreases, respectively, corresponding to net increases of, respectively, 14,600 and 13,500 acres of habitat. And Alternative D would show a 21 percent decrease, which corresponds to a net increase of 5,700 acres of habitat.

Figure 3-203 shows how the acres of the moist forest non-habitat in critical habitat units on BLM-administered land would change over time under each alternative. Because the critical habitat units are identical under all alternatives, changes in the acres of non-habitat are directly comparable among alternatives.

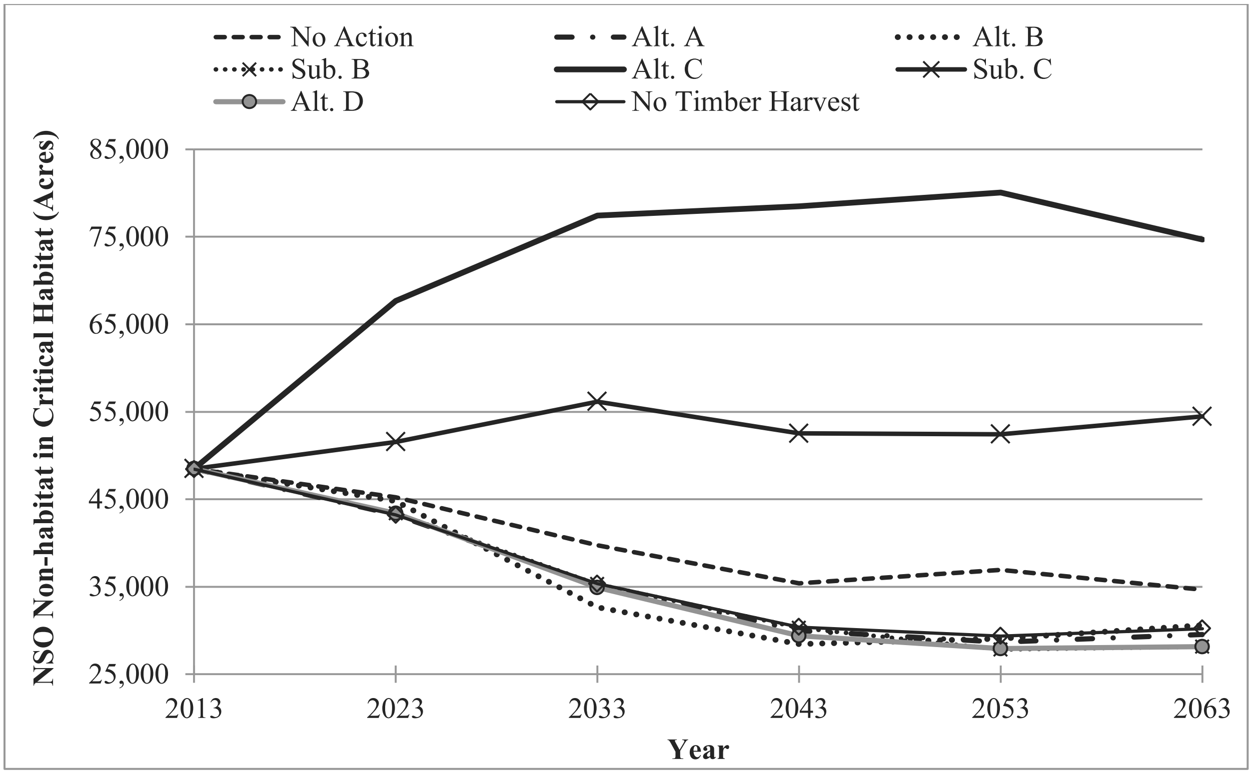


Figure 3-203. Forecasted change, by alternative, in the acres of the forested landscape that would be strongly avoided by northern spotted owls (i.e., non-habitat) in critical habitat units on BLM-administered land.
The No Timber Harvest Reference Analysis is included for comparison.

Under both Sub-alternative B and Alternative D, the net acres of moist forest non-habitat in critical habitat would decrease by 42 percent during the next 50 years, which corresponds to a net increase of 20,300 acres of northern spotted owl habitat under each alternative. These are followed by alternatives A and B, and the No Action alternative, which, respectively, would cause 39, 37, and 29 percent decreases, corresponding to net increases of 19,000, 17,900 and 13,800 acres of habitat, respectively. Alternative C and Sub-alternative C would cause 54 and 12 percent increases in the acres of non-habitat, respectively, which correspond to net losses of 26,200 and 6,000 acres of habitat, respectively.

Therefore, under all alternatives, the BLM would delineate at least one reserve land use allocation in the moist forest and, within that allocation, implement silvicultural techniques in plantations, overstocked stands and modified younger stands that would benefit (i.e., result in net increases in the amount of habitat for) the northern spotted owl. As a result, all alternatives would result in a decrease in the acres of non-habitat in the reserve land use allocation in the moist forest over time from current amounts. However, in designated critical habitat in the moist forest, Alternative C and Sub-alternative C would result in increases in the acres of non-habitat over time from current amounts, and all other alternatives would result in decreases in the acres of non-habitat.

Issue 6

In accordance with Recovery Action 10, would the alternatives conserve northern spotted owl sites and high value northern spotted owl habitat to provide additional demographic support to the northern spotted owl population?

Summary of Analytical Methods

The intent of Recovery Action 10 "is to protect, enhance and develop habitat in the quantity and distribution necessary to provide for the long-term recovery of spotted owls" (USDI FWS 2011a, p. III-44). Conservation needs 1 and 2 also address this intent. However, Recovery Action 10 also focuses on the management of individual northern spotted owl nest sites and "high value" northern spotted owl habitat, which the Revised Recovery Plan defines as "older, multi-layered structurally-complex forests" and "areas with current and historic use by spotted owls" (USDI FWS 2011a, p. G-2).

The U.S. Fish and Wildlife Service does not recommend, through Recovery Action 10, that land managers protect all northern spotted owl known and historic sites. Instead, the Service recommends habitat enhancement to promote long term northern spotted owl conservation even when such enhancement would have short-term negative effects to individual northern spotted owl pairs or resident singles (USDI FWS 2011a, p. III-44). The Service also recommends interim guidance on how land managers should rank northern spotted owl sites according to their priority for protection, and standards for the protection of northern spotted owl habitat within the 500-acre (200-ha) core use area and the median provincial home range area that surround each site (USDI FWS 2011a, p. III-44 – III-45). The Service recommends that northern spotted owl sites be managed so that at least 50 percent of the 500-acre core use area, and at least 40 percent of the median provincial home range area, support nesting-roosting habitat (USDI FWS 2011a). However, the Service does not estimate, or provide criteria to estimate, which or how many northern spotted owl sites the BLM should maintain to be consistent with Recovery Action 10. Therefore, the evaluation of the consistency of each alternative with Recovery Action 10 is complicated by the primary focus of Recovery Action 10 on individual known and historic northern spotted owl sites, the flexibility Recovery Action 10 provides for the management of individual sites, and the lack of recommended criteria to evaluate consistency with Recovery Action 10.

Confining the analysis to the planning area, the BLM determined the locations of northern spotted owl known and historic sites on or near BLM-administered lands from demography studies on those lands (Forsman *et al.* 2011, pp. 5-8), survey data the BLM and its cooperators collected as part of Northwest Forest Plan effectiveness monitoring, and additional survey data since the 1970s. The BLM and its cooperators have surveyed about 80 percent of BLM-administered lands in the planning area for northern spotted owls; all survey results are maintained in the BLM corporate database. The BLM then tabulated if habitat conditions within the 500-acre core use area and the median provincial home range circles surrounding each site would meet the thresholds of Recovery Action 10 (i.e., at least 50 percent nesting-roosting habitat within the 500-acre core use area and at least 40 percent nesting-roosting habitat within the median provincial home range area).

In addition to managing habitat within the 500-acre core use area and the median provincial home range area around each northern spotted owl site, Swindle *et. al* (1999, p. 1216) determined that, in the central Cascades of Oregon, northern spotted owl nest site selection was most influenced by the amount of older forest habitat within 660 feet (200 m) of each site. Since the intent of Recovery Action 10 is to conserve extant northern spotted owl sites, the BLM added the standard of maintaining all forest habitat within 660 feet of those sites, even though Recovery Action 10 does not specifically recommend such protection.

Northern spotted owls on BLM-administered lands are known to nest, and produce young, in habitat conditions that are well below Recovery Action 10 thresholds. This analysis does not account for additional protections that the site-specific implementation of Recovery Action 10 might provide for such pairs.

Affected Environment and Environmental Effects

There currently are 2,465 known (including historic) northern spotted owl sites associated with BLM-administered lands in the planning area (i.e., their provincial home ranges include BLM-administered lands). Of these known sites, 1,453 sites (59 percent) meet Recovery Action 10 thresholds. In 30 years, according to the No Timber Harvest Reference Analysis, 1,718 known sites (70 percent) would be capable of meeting Recovery Action 10 thresholds; in 50 years the number increases to 1,799 known sites (73 percent). According to the No Timber Harvest Reference Analysis, the remaining 27 percent of known sites are not capable of meeting Recovery Action 10 thresholds in 50 years due to the limited BLM-administered lands, slow habitat development of some BLM-administered lands because of poor site conditions, and competing land uses on other land ownerships.

Figure 3-204 shows the number of northern spotted owl known sites that would be at or above Recovery Action 10 habitat thresholds, during each decade, under each alternative. In 50 years, Sub-alternative B and Alternative D would support the greatest numbers of northern spotted owl known sites at or above Recovery Action 10 thresholds (including the protection of habitat within 660 feet of the site), because both alternatives require the restoration and protection of nesting-roosting habitat around all known sites in accordance with those thresholds. During this period, Sub-alternative B would support a 24 percent increase in the number of known sites at or above thresholds compared to a 23 percent increase under Alternative D. Interestingly, at 50 years, Sub-alternative B would support very slightly more known sites at or above thresholds than under the No Timber Harvest Reference Analysis, 1,803 and 1,799, respectively, suggesting the benefit of restoration thinning under Sub-alternative B.[111]

[111] Alternative B and Sub-alternative B include protection of 69,700 acres of lands with wilderness characteristics. Since northern spotted owl habitat restoration would not be consistent with management for wilderness characteristics, and BLM modeling did not account for this restriction, the level of change might not be as great as shown (see the Lands with Wilderness Characteristics section in this chapter).

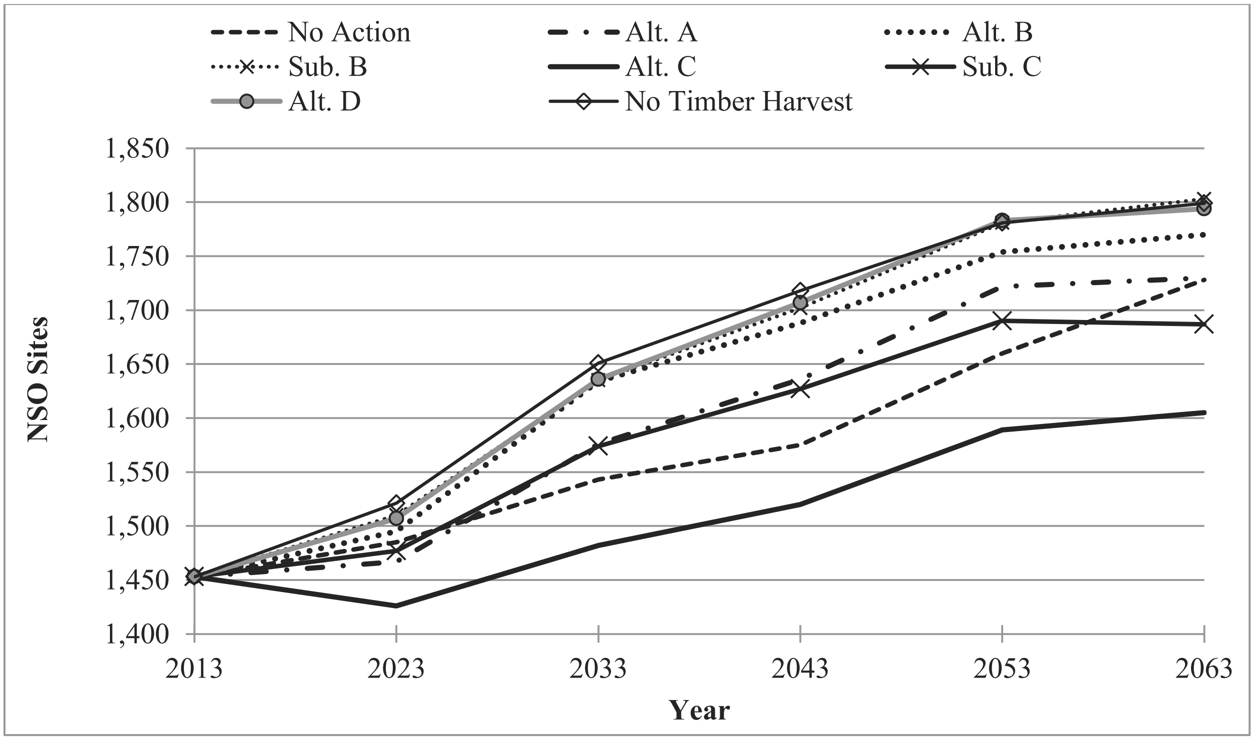


Figure 3-204. Number of northern spotted owl sites that would be at or above Recovery Action 10 habitat thresholds under each alternative during each decade.
The No Timber Harvest Reference Analysis is included for comparison.

Alternative B would result in nearly as many known sites at or above thresholds as Sub-alternative B and Alternative D. Alternative B also includes restoration thinning, but would protect northern spotted owl known sites only to the extent provided by the underlying land use allocation. Other than this difference, Alternative B is identical in design to Sub-alternative B. After 50 years, Alternative B would support a 22-percent increase in the number of northern spotted owl known sites at or above Recovery Action 10 thresholds. Thus, the network of reserve land use allocations under Alternative B would provide almost the same level of protection to northern spotted known sites as would the protection of all known sites.

Alternative A and the No Action alternative both would result in 19-percent increases in the number of northern spotted owl known sites at or above Recovery Action 10 thresholds after 50 years. However, the No Action alternative would result in lower numbers of known sites at or above Recovery Action 10 thresholds during intervening decades (**Figure 3-204**). The No Action alternative requires protection of 100 acres of northern spotted owl habitat around "known owl activity centers" (USDA FS and USDI BLM 1994, p. C-45). However, this protection only applies to the 630 sites known on January 1, 1994 (i.e., 26 percent of the currently known sites) and does not include sites identified after that date. Alternative A would protect northern spotted owl known sites only to the extent provided by the underlying land use allocation.

Of all alternatives, Alternative C and Sub-alternative C would result in the least number of northern spotted owl known sites at or above Recovery Action 10 thresholds after 50 years. Like Alternatives A and B, Alternative C and Sub-alternative C would protect northern spotted owl known sites only to the extent provided by the underlying land use allocation. These two alternatives are identical in design, except that Alternative C requires the protection of all forest stands 160 years and older and Sub-alternative C requires the protection of all forest stands 80-years-old and older. Nonetheless, in 50 years, Alternative C would support a 10-percent increase in the number of northern spotted owl known sites at or above Recovery Action 10 thresholds, whereas Sub-alternative C would support a 16-percent increase.

Issue 7

In accordance with Recovery Action 12, would the BLM implement post-fire silvicultural activities on lands managed for the development of spotted owl habitat, and that are modified by wildfire, that conserve and restore habitat elements that take a long time to develop, such as large trees, medium and large snags, and downed wood?

Summary of Analytical Methods

For this analysis, the BLM initially interpreted "lands managed for the development of spotted owl habitat" to refer to reserve land use allocations (see the narrative for Issue 5). However, as discussed under Issue 5, the U.S. Fish and Wildlife Service stated that the *Revised Recovery Plan* (and hence this recovery action) also pertains to 2012 northern spotted owl critical habitat. Therefore, based on this input from the U.S. Fish and Wildlife Service, the BLM interprets "lands managed for the development of spotted owl habitat" for this analysis as reserve land use allocations and designated critical habitat.

As described in Appendix S-A, the BLM forecasted wildfire locations, footprints and intensities (i.e., how fire would modify northern spotted owl relative habitat suitability values within its fire footprint) on all land ownerships within the northern spotted owl's range, including on BLM-administered lands in the planning area, at decadal increments during the next 50 years. The *Revised Recovery Plan* summarizes the effects of post-fire logging on northern spotted owl habitat (USDI FWS 2011a, pp. III-47 – III-49).

The alternatives vary in the management direction for post-fire silvicultural activities in reserve land use allocations and critical habitat. The BLM tabulated the acres of BLM-administered lands in reserve land use allocations and in each critical habitat subunit modified by wildfire during each decade, and described qualitatively the management standards for those lands under each alternative.

Affected Environment and Environmental Effects

Since the No Timber Harvest Reference Analysis does not include silvicultural prescriptions, the BLM cannot describe the capability of BLM-administered lands to contribute to Recovery Action 12.

Table 3-269 shows the acres of reserve land use allocations (Late-Successional Reserve and Riparian Reserve that is interspersed within Late-Successional Reserve) that would be affected by high- and moderate-intensity wildfire during each decade. Because simulated wildfires are identical under each alternative, acre differences are a function of the size and location of the reserve land use allocations of each alternative.

Table 3-269. Acres of reserve land use allocations that would be affected by high- and moderate-intensity wildfire during each decade.

Alternative	Decade (Acres)				
	2013-2023	2023-2033	2033-2043	2043-2053	2053-2063
No Action	3,500	3,700	3,900	600	2,300
Alt. A	10,000	7,000	12,800	5,900	12,200
Alt. B	7,200	4,900	9,000	1,800	6,700
Sub. B	8,600	6,600	11,600	3,500	10,900
Alt. C	7,300	4,700	9,900	1,500	6,900
Sub. C	9,000	6,000	13,600	6,600	9,400
Alt. D	4,000	2,900	7,400	1,400	5,700

Table 3-270 shows the acres of northern spotted owl critical habitat that would be affected by high- and moderate-intensity wildfire during each decade. Because the simulated fires are identical under all alternatives, the acres of affected critical habitat are identical under each alternative.

Table 3-270. Acres of northern spotted owl critical habitat that would be affected by high- and moderate-intensity wildfire during each decade.

Habitat	Decade (Acres)				
	2013-2023	2023-2033	2033-2043	2043-2053	2053-2063
Critical Habitat	9,000	6,500	8,900	3,700	10,200

With respect to the treatment of areas affected by wildfire:

Under the No Action alternative:

- Salvage operations are permitted in Late-Successional Reserves and northern spotted owl Reserves Pair Areas only to facilitate forest restoration following stand-replacement events (USDA FS and USDI BLM 1994, pp. C-13 and D-17).
- Within Managed Late-Successional Areas, salvage "always should be guided by the objective of maintaining adequate amounts of suitable habitat" (USDA FS and USDI BLM 1994, p. C-26).
- Salvage following catastrophic events is permitted in Riparian Reserves "if required to attain Aquatic Conservation Strategy objectives" (USDA FS and USDI BLM 1994, p. C-32).
- Salvage is permitted in other land use allocations to the extent it complies with snag and coarse woody debris requirements.

Under all action alternatives, the BLM would:

- Implement wildfire rehabilitation and restoration efforts in all land use allocations to protect and sustain ecosystems, ecosystem services, public health and safety, and infrastructure adversely affected by suppression actions (fire operations) or direct fire effects.
- Regenerate large scale disturbances within the dry forest Late-Successional Reserves within five years using a mixture of plant species appropriate to the site. The BLM would leave at least ten percent of the disturbance area unstocked with trees, in gaps at least one-quarter-acre in size for at least two decades, to accelerate the development of heterogeneous fuel conditions.
- Implement timber salvage operations in the Harvest Land Base (including in northern spotted owl critical habitat in the Harvest Land Base) to recover economic value and minimize commercial

loss or the deterioration of damaged trees. Salvage operations would comply with alternative-specific stand-level snag and coarse woody debris retention standards.
- Prohibit timber salvage in Riparian Reserves.

In Late-Successional Reserves and Critical Habitat within Late-Successional Reserves:

- Under Alternative A, Alternative B, Sub-alternative B and Alternative D, the BLM would prohibit timber salvage in Late-Successional Reserves except when necessary to protect public health and safety, or to keep roads and other infrastructure clear of debris. Under Alternative A, Late-Successional Reserves would completely encompass northern spotted owl critical habitat and, thus, would prohibit timber salvage in all critical habitat.
- Under Alternative C and Sub-alternative C, the BLM would implement timber salvage operations in Late-Successional Reserves to recover economic value and minimize commercial loss or the deterioration of damaged trees. For disturbances that kill at least 60 percent of overstory trees on contiguous areas of at least 10 acres, timber salvage would remove all dead wood volume in excess of down wood and snag requirements. For other disturbances, timber salvage would occur only as needed to reduce hazards to public health and safety.

In Critical Habitat within the Harvest Land Base:

- Under Alternative A, no critical habitat occurs in the Harvest Land Base.
- Under Alternatives B and Sub-alternative B, for disturbances in Low Intensity Timber Areas (moist forest) that kill at least 60 percent of overstory trees on contiguous areas of at least10 acres, timber salvage would follow the management direction for regeneration harvest. For all other disturbances (in the moist and dry forest), timber salvage would remove all dead wood volume in excess of down wood and snag requirements.
- Under Alternative C and Sub-alternative C, the BLM would implement timber salvage operations in Late-Successional Reserves to recover economic value and minimize commercial loss or the deterioration of damaged trees. In High Intensity Timber Areas timber salvage would remove all merchantable dead and down timber from disturbed areas (although areas probably would be clear cut to also remove live trees). In other portions of the Harvest Land Base, timber salvage would remove all merchantable dead wood volume in excess of down wood and snag requirements.
- Under Alternative D, for disturbances that kill at least 60 percent of overstory trees on contiguous areas of at least 10 acres, timber salvage would remove all dead wood volume in excess of down wood and snag requirements. For other disturbances, timber salvage would occur only as needed to reduce hazards to public health and safety

Therefore, in Late-Successional Reserve and Riparian Reserve, the No Action alternative and each of the action alternatives would manage areas modified by wildfire to "conserve and restore habitat elements that take a long time to develop, such as large trees, medium and large snags, and downed wood." However, when wildfire kills at least 60 percent of overstory trees on contiguous areas of at least 10 acres in Late-Successional Reserves, Alternative C and Sub-alternative C would allow the removal of all dead wood volume in excess of down wood and snag retention standards, which would be the minimum level needed "to conserve and restore habitat elements."

In northern spotted owl critical habitat in the Harvest Land Base, the No Action alternative and Alternative B, Sub-alternative B, and Alternative D would allow salvage operations that meet down wood and snag retention standards, the minimum level needed "to conserve and restore habitat elements." Alternative A has no critical habitat in the Harvest Land Base. Alternative C and Sub-alternative C would allow the removal of all dead wood from burned areas in High Intensity Timber Areas, which would be inconsistent with the standard "to conserve and restore habitat elements."

Issue 8

In accordance with Recovery Action 32, would the alternatives maintain and restore well-distributed, older and more structurally-complex multi-layered conifer forests on BLM-administered lands in the planning area while allowing for other threats, such as fire and insects, to be addressed by restoration management actions?

Summary of Analytical Methods

The Revised Recovery Plan does not define "older and more structurally-complex multi-layered conifer forest" in terms of stand age, tree diameter, percent canopy cover or other forest stand structural variables that the BLM has for its administered lands. Therefore, the BLM quantified changes in the acres of habitat using two surrogate classifications:

- Forest stands classified in the BLM structural stage classification as mature multiple canopy and structurally-complex
- Habitat that northern spotted owls select most strongly for nesting, i.e., "strongly-selected-for" habitat as defined in **Appendix S-A**

The definitions of the mature multiple canopy and structurally-complex forest in this analysis generally encompass the characteristics described in the Revised Recovery Plan for "older and more structurally-complex multi-layered conifer forest" (see the Vegetation Modeling and Forest Management sections). However, the Revised Recovery Plan includes maintaining and restoring "older and more structurally-complex multi-layered conifer forest" because of its value as northern spotted owl habitat. Therefore, the "strongly-selected-for" habitat presents another valid surrogate for "older and more structurally-complex multi-layered conifer forest." In addition, structural stages and "strongly-selected-for" habitat are defined at different scales, and analysis at multiple scales provides a more robust analysis.

The BLM defined structural stage at the stand scale in this analysis. As explained in **Appendix S-A**, the BLM defined the association between northern spotted owls and their habitat at a 500-acre (~ 200-ha) scale, the size of a core use area. As such, the strongly-selected-for classification reflects habitat value at that scale instead of at the scale of the individual forest stand. Stated another way, the strong association of northern spotted owls to certain forest stands, as reflected in the strongly-selected-for classification, is affected by habitat conditions within the stand and the surrounding 500 acres. Thus, the structural complexity of an individual forest stand could increase over time while, at the same time, the value of that stand for northern spotted owl occupancy could decline due to changes to nearby stands (e.g., from treatment or wildfire). In such a situation, evaluating stand structure would show a positive change whereas evaluating the value of the stand for northern spotted owl occupancy would show a negative change. Thus, the BLM used both classifications.

Affected Environment and Environmental Effects

BLM-administered lands in the planning area currently support 406,400 acres of strongly-selected-for habitat and 862,400 acres of mature multiple canopy and structurally-complex forest. The No Timber Harvest Reference Analysis indicates that the forested landscape managed by the BLM is capable of supporting 630,600 acres of strongly-selected-for habitat (a 55-percent increase), and 1,136,700 acres of mature multiple canopy and structurally-complex (a 32-percent increase) in 50 years.

Figure 3-205 shows the acres of strongly-selected-for habitat that would occur on BLM-administered lands during the next 50 years under each alternative. As described above, this analysis reflects habitat conditions at a 500-acre scale. This explains why, Sub-alternative C, which would reserve all forest stands 80-years-old and older, would result in 592,100 acres of strongly-selected-for habitat in 50 years (a 46 percent increase), which is less than the 630,600 acres calculated by the No Timber Harvest Reference Analysis. Even though Sub-alternative C would reserve all forest stands 80-years-old and older and thereby reserve nearly all structurally-complex stands, it also would prohibit restoration thinning in those stands that currently are 80 years and older that are not yet structurally-complex. In addition, the harvest of less than 80-year-old forest stands under Sub-alternative C not only would delay the development of structural complexity in those stands, but, more importantly, diminish the value of nearby, structurally-complex stands for owl occupancy.

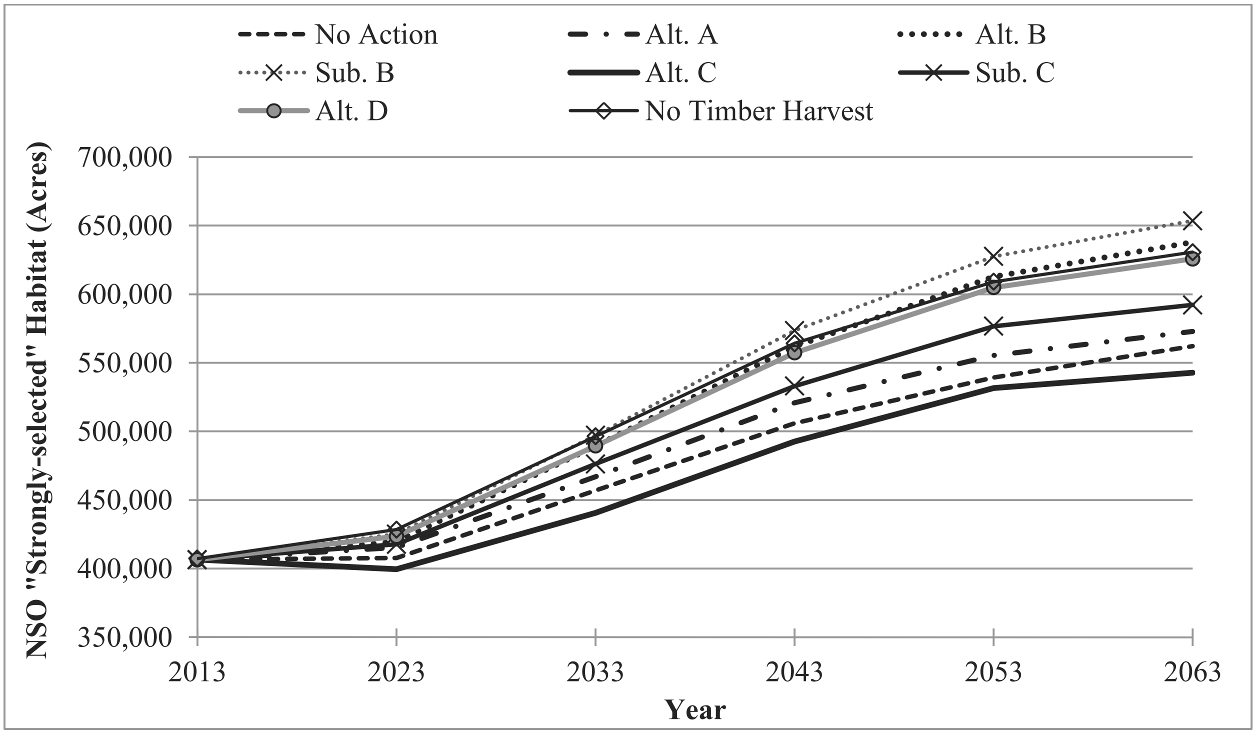


Figure 3-205. Change, by alternative, in the acres of "strongly-selected-for" habitat on BLM-administered lands in western Oregon.
The No Timber Harvest Reference Analysis is included for comparison.

The value of restoration thinning is seen in the results for Sub-alternative B, and to a lesser extent Alternative B, which show the development of more strongly-selected-for habitat in 50 years than would occur according to the No Timber Harvest Reference Analysis. Both alternatives promote restoration thinning, which, in turn, promotes development of structural complexity and the value of adjacent stands for northern spotted owl occupancy. In 50 years, Sub-alternative B would generate 653,500 acres of strongly-selected-for habitat, a 61 percent increase, and Alternative B would generate 638,000 acres, a 57 percent increase. Alternative D would result in 625,800 acres of strongly-selected-for habitat in 50 years, a 54 percent increase. Alternative C would result in the lowest increase in strongly-selected-for habitat over 50 years: 542,800 acres or a 34 percent increase.

Figure 3-206 shows the acres of mature multiple canopy and structurally-complex forest that would occur on BLM-administered lands during the next 50 years under each alternative. The progressions are similar to those shown in **Figure 3-205** (i.e., more acres would develop under Sub-alternative B and alternatives B and D than under the other alternatives). Alternative D would result in a 32 percent increase in structurally-complex forest, exceeding that of the No Timber Harvest Reference Analysis. Sub-alternative B would result in a 29 percent increase, followed by Alternative B (26 percent), and Alternative A and Sub-alternative C (23 percent each), Alternative C (12 percent) and the No Action alternative (11 percent).

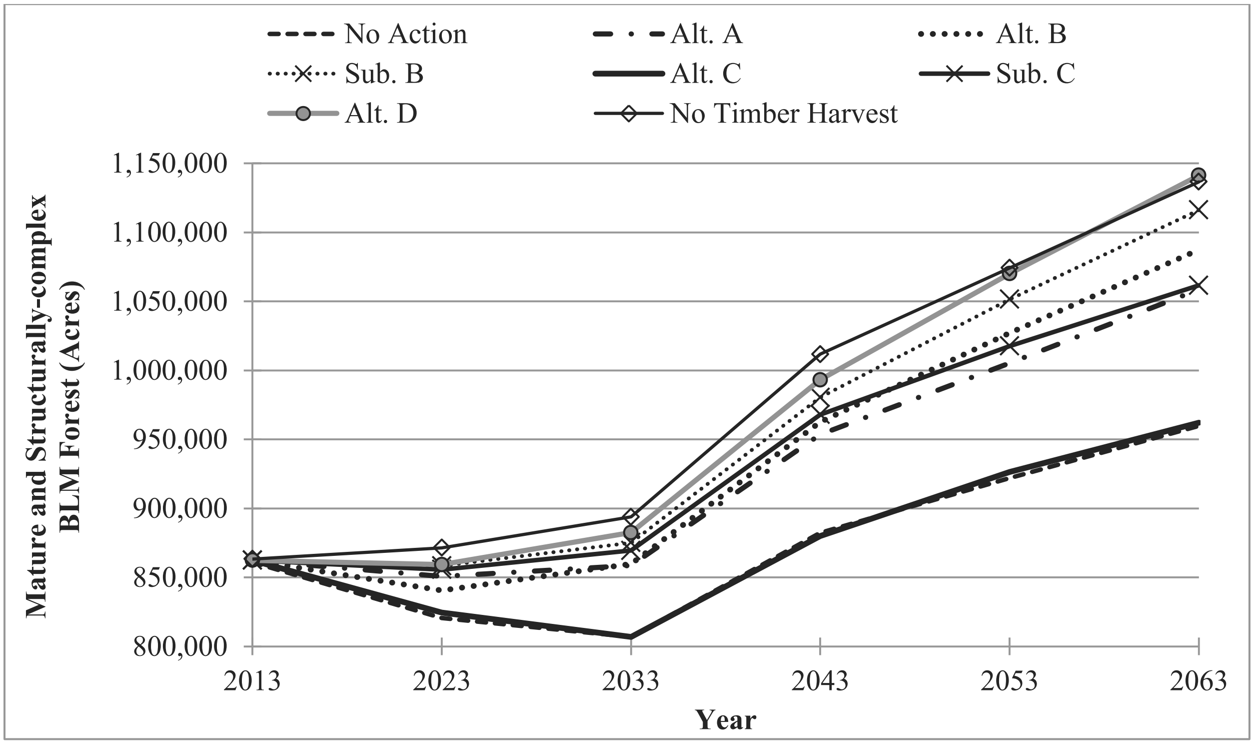


Figure 3-206. Change, by alternative, in the acres of mature multiple-canopy and structurally-complex forest on BLM-administered lands in western Oregon.
The No Timber Harvest Reference Analysis is included for comparison.

Thus, under all alternatives, the BLM would maintain well-distributed, older and more structurally-complex multi-layered conifer forests, but the alternatives differ substantively in the amounts and how the BLM would address restoration management actions.

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Northern Spotted Owl Critical Habitat

Key Points

- Under all alternatives, the BLM would manage northern spotted owl critical habitat in accordance with the "special management considerations or protections" mandated by the final rule on critical habitat.
- BLM-administered lands in western Oregon currently support 1,561 known (including historic) northern spotted owl sites in critical habitat units, of which 75 percent meet Recovery Action 10 habitat thresholds. Under the alternatives, the number of northern spotted owl sites in critical habitat meeting Recovery Action 10 thresholds would increase by 1 to 11 percent in 30 years, and 3 to 14 percent in 50 years.
- BLM-administered lands in western Oregon currently support 302,800 acres of structurally-complex forest in critical habitat units. Under the alternatives, structurally-complex forest would increase in critical habitat by 21 to 37 percent in 30 years, and 29 to 50 percent in 50 years.

Background

Sec. 3(5)(A)(i) of the Endangered Species Act of 1973, as amended (ESA), defines critical habitat as having "those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection." The U.S. Fish and Wildlife Service, in its final rule on northern spotted owl critical habitat (77 FR 71908); hereafter referred to as the final rule), stated four "special management considerations or protections" (hereafter referred to as "considerations") for critical habitat in the western Cascades and Coast Range of Oregon, and eight for the eastern Cascades of Oregon (77 FR 71908). These same considerations apply to the Klamath Basin of southwestern Oregon depending on site-specific moist and dry forest conditions (77 FR 71910).

Oregon Western Cascades and Coast Range:

"(1) Conserve older stands that contain the conditions to support northern spotted owl occupancy or high-value northern spotted owl habitat as described in Recovery Actions 10 and 32 (USDI FWS 2011, pp. III–43, III–67). On Federal lands, this recommendation applies to all land-use allocations (see also Thomas *et al.* 2006, pp. 284-285).
(2) Management emphasis needs to be placed on meeting northern spotted owl recovery goals and long-term ecosystem restoration and conservation. When there is a conflict between these goals, actions that would disturb or remove the essential physical or biological features of northern spotted owl critical habitat need to be minimized and reconciled with long-term ecosystem restoration goals.
(3) Continue to manage for large, continuous [*sic*] blocks of late-successional forest.
(4) In areas that are not currently late seral forest or high-value habitat and where more traditional forest management might be conducted (e.g. matrix), these activities should consider applying ecological forestry prescriptions. Some examples that could be utilized include Franklin *et al.* (2002, pp. 417-421; 2007, entire), Kerr (2012), Drever *et al.* (2006, entire), Johnson and Franklin (2009, pp. 39-41), Swanson *et al.* (2010, entire), and others cited in the Revised Recovery Plan for the Northern Spotted Owl (USDI FWS 2011, pp. III–14, III–17 to III–19)."

Oregon Eastern Cascades:

"(1) Conserve older stands that contain the conditions to support northern spotted owl occupancy or high-value northern spotted owl habitat as described in Recovery Actions 10 and 32 (USDI FWS 2011, pp. III–

43, III–67). On Federal lands this recommendation applies to all land-use allocations (see also Thomas *et al.* 2006, pp. 284-285).
(2) Emphasize vegetation management treatments outside of northern spotted owl territories or highly suitable habitat;
(3) Design and implement restoration treatments at the landscape level;
(4) Retain and restore key structural components, including large and old trees, large snags, and downed logs;
(5) Retain and restore heterogeneity within stands;
(6) Retain and restore heterogeneity among stands;
(7) Manage roads to address fire risk; and
(8) Consider vegetation management objectives when managing wildfires, where appropriate."

The U.S. Fish and Wildlife Service delineated the northern spotted owl range into sixty-one critical habitat subunits within eleven critical habitat units (77 FR 71918). Of these, thirty critical habitat subunits—within all or parts of seven critical habitat units—occur in the planning area. To evaluate the potential effects of a proposed project on northern spotted owl critical habitat, the Service evaluates the potential effects of the project on each of the pertinent considerations at three scales: the critical habitat subunit, the critical habitat unit, and all critical habitat (77 FR 71941).

To evaluate the potential effects of each alternative on northern spotted owl critical habitat, the BLM developed spatial and tabular data, at these three scales, on how critical habitat would change over time under each alternative. In addition, as described below, the BLM evaluated the consistency of the alternatives with each of the considerations to the extent it could develop relevant data.

Issue 1

In accordance with Consideration (1) for the Oregon Western Cascades and Coast Range, and Oregon Eastern Cascades, would the alternatives conserve older stands of northern spotted owl critical habitat that contain the conditions to support northern spotted owl occupancy or high-value northern spotted owl habitat as described in recovery actions 10 and 32?

Summary of Analytical Methods

The BLM evaluated its potential contributions to "conditions to support northern spotted owl occupancy as described in Recovery Actions 10 and 32" on all lands in the planning area in its evaluations of northern spotted owl Issues 1 through 4, 6, and 8. Although the evaluations of northern spotted owl issues 1through 4 are not specific to northern spotted owl critical habitat, they are sufficient to address this consideration, because the Conservation Needs addressed by northern spotted owl Issues 1 through 4, themselves, are not specific to critical habitat. With respect to northern spotted owl Issues 6 and 8, which specifically address Recovery Actions 10 and 32, the BLM tabulated subsets, specific to critical habitat, of the data it developed for northern spotted owl Issues 6 and 8.

Affected Environment and Environmental Effects

Northern spotted owl Issue 6 contains background information on the evaluation of Recovery Action 10 consistency in critical habitat. Currently, 1,561 known (including historic) northern spotted owl sites are associated with critical habitat on BLM-administered lands in the planning area (i.e., critical habitat occurs within the median provincial home range around these sites). Of these, 1,169 (75 percent) currently meet Recovery Action 10 habitat thresholds (i.e., have at least 50 percent nesting-roosting habitat within the 500-acre core use area and have at least 40 percent nesting-roosting habitat within the mean provincial home range area). According to the No Timber Harvest Reference Analysis, the forested landscape managed by the BLM is capable of supporting 1,298 (83 percent) of these sites at Recovery Action 10 thresholds in 30 years, and 1,327 (85 percent) in 50 years. The BLM is not able to support all known sites at or above thresholds because of site-potential conditions on some BLM-administered lands and land uses on adjacent ownerships that fall within core use areas or median provincial home ranges.

Figure 3-207 shows changes, by alternative, in the number of northern spotted owl known sites in critical habitat that would be at or above Recovery Action 10 habitat thresholds. In 50 years, Sub-alternative B and Alternative D would support the greatest numbers of northern spotted owl known sites at or above thresholds, because both alternatives require the restoration and protection of nesting-roosting habitat around known sites in accordance with those thresholds. During this period, Sub-alternative B and Alternative D each would support 14 percent increases in the number of known sites at or above thresholds. Interestingly, at 50 years, both alternatives would support slightly more known sites at or above thresholds than estimated by the No Timber Harvest Reference Analysis—1,331 for Sub-alternative B and 1,328 for Alternative D versus 1,327 according to the No Timber Harvest Analysis—suggesting the benefit of restoration thinning under the action alternatives. Almost as beneficial would be Alternative B, which would manage northern spotted owl known sites in accordance with the underlying land use allocation, and does not require the restoration and protection of nesting-roosting habitat around those sites. Other than this, Alternative B is identical to Sub-alternative B. In 50 years, Alternative B would support 1,322 northern spotted owl known sites at or above Recovery Action 10 thresholds, a 13 percent increase. Thus, the network of reserved lands under Alternative B would provide almost the same level of support to northern spotted known sites, in terms of Recovery Action 10 thresholds, as would the protection of all known sites. Alternative A, in which all critical habitat is included in Late-Successional Reserves, would be as beneficial as Alternative B, also supporting a 13 percent increase in the number of northern spotted owls at or above Recovery Action 10 thresholds in 50 years. The No Action alternative, Alternative C and Sub-alternative C would provide substantially less protection to northern spotted owl known sites in critical habitat. Alternative C and Sub-alternative C are identical except that Sub-alternative C requires the protection of all forest stands at least 80-years-old. After 50 years, the No Action alternative would support 1,288 northern spotted owl known sites at or above Recovery Action 10 thresholds, a 10 percent increase, whereas Alternative C would support 1,208 sites at or above thresholds, a 3 percent increase, and Sub-alternative C would support 1,270 known sites at or above thresholds, a 9 percent increase.

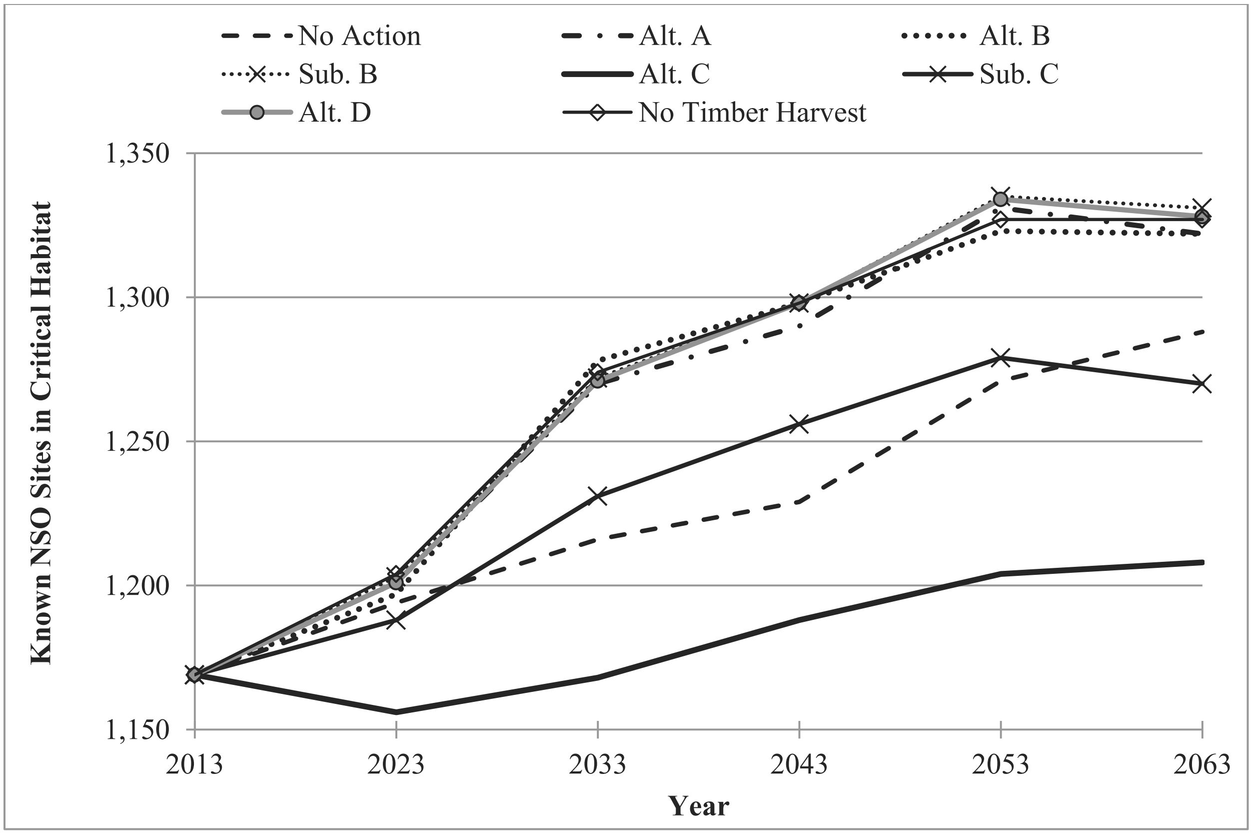

Figure 3-207. Number of northern spotted owl known sites in critical habitat on BLM-administered lands that would be at or above Recovery Action 10 habitat thresholds under each alternative during each decade.

Potential change according to the No Timber Harvest Reference Analysis is included for comparison.

Please see Northern Spotted Owl Issue 8 for background information on the evaluation of Recovery Action 32 consistency in critical habitat. Currently, BLM-administered lands in the planning area in critical habitat, support 302,800 acres of strongly-selected-for habitat. According to the No Timber Harvest Reference Analysis, these lands are capable of supporting 397,500 acres of strongly-selected-for habitat in 30 years and 429,400 acres in 50 years, which correspond to increases of 31 and 42 percent, respectively.

Figure 3-208 shows changes in the acres of strongly-selected-for habitat, in critical habitat, on BLM-administered lands in western Oregon under each alternative. The results are similar to those for all BLM-administered lands, as discussed under Northern Spotted Owl Issue 8, and for the same reasons. Sub-alternative B and Alternative B would show the greatest increases in strongly-selected-for habitat, to 454,500 acres and 448,400 acres, corresponding to increases of 50 percent and 48 percent, respectively. These are followed by Alternatives D and A, which would show increases to 437,200 acres and 430,000 acres, which correspond to increases of 44 percent and 42 percent, respectively. Each of these alternatives would show a greater increase in strongly-selected-for habitat than estimated by the No Timber Harvest Reference Analysis, which illustrates the value of restoration thinning. Under Sub-alternative C, the development of strongly-selected-for habitat would lag behind that estimated by the No Timber Harvest Reference Analysis, even though Sub-alternative C requires the protection of all forest stands 80-years-old and older, which includes all strongly-selected-for habitat. The reason for this is described under Northern Spotted Owl Issue 8. Finally, Alternative C and the No Action alternative would support the least amounts of strongly-selected-for habitat in critical habitat in 50 years, just over 392,000 acres each, or less than 30 percent increases.

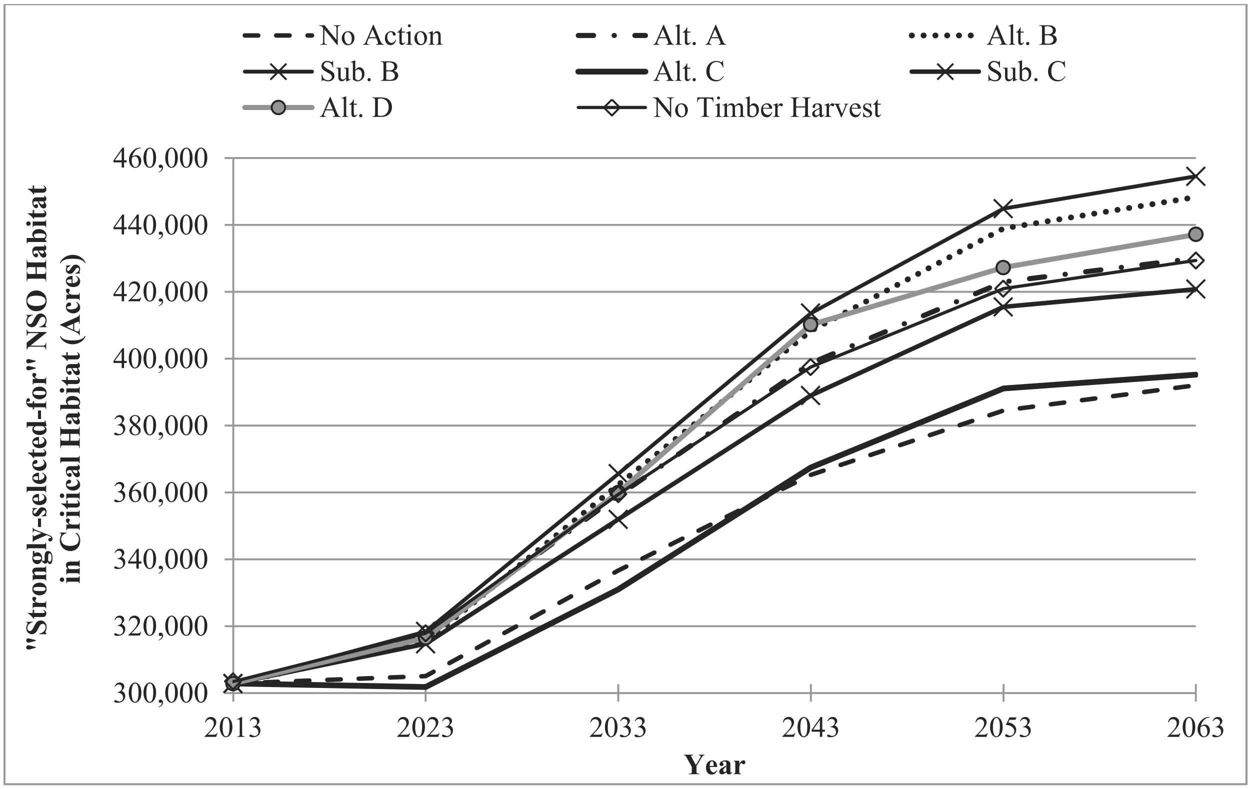

Figure 3-208. Change, by alternative, in the acres of "strongly-selected-for" habitat in critical habitat on BLM-administered lands in western Oregon.
The No Timber Harvest Reference Analysis is shown for comparison.

As verified by these analyses and those that address northern spotted owl Issues 1through 4, under all alternatives, the BLM would conserve older stands of northern spotted owl critical habitat that contain the conditions to support northern spotted owl occupancy or high-value northern spotted owl habitat as described in Recovery Actions 10 and 32. However, the level of conservation would vary substantially by alternative.

Issue 2

In accordance with Consideration (2) for the western Cascades, Coast Range and moist-forest portions of the Klamath Basin, would the alternatives manage northern spotted owl critical habitat to meet northern spotted owl recovery goals and long-term ecosystem restoration and conservation?

Summary of Analytical Methods

The BLM evaluated its potential contributions to "northern spotted owl recovery goals and long-term ecosystem restoration and conservation" on all lands in western Oregon during its evaluations of northern spotted owl Issues 1 through 4. Although those evaluations are not specific to northern spotted owl critical habitat, the evaluations of BLM contributions to a landscape in the planning area that meets the conservation needs of the northern spotted owl also evaluate if the BLM would manage critical habitat within that landscape to emphasize "northern spotted owl recovery goals and long-term ecosystem restoration and conservation." Therefore, the BLM needs no additional analysis to address this issue.

Affected Environment and Environmental Effects

As evidenced by the evaluations of northern spotted owl Issues 1, 2, and 4, under all alternatives, the BLM would manage its lands, including those in critical habitat, in a manner that contributes to a landscape in the planning area that meets northern spotted owl recovery goals and long-term ecosystem restoration and conservation. That said, current habitat conditions in the northern half of the Oregon Coast Range Physiographic Province, along with limited BLM-administered land in that area, preclude the BLM from contributing to a landscape in that area that meets the conservation needs of the northern spotted owl. In addition, as describe under northern spotted owl Issue 4, during the next 50 years, the BLM, through the management of its lands in planning area, is incapable of moderating risks to northern spotted owl populations in portions of the planning area.

Issue 3

In accordance with Consideration (3) for the western Cascades, Coast Range and moist-forest portions of the Klamath Basin, would the alternatives manage northern spotted owl critical habitat for large, contiguous blocks of late-successional forest?

Summary of Analytical Methods

The BLM evaluated its potential contributions to "large, contiguous blocks of late-successional forest" on all lands in the planning area during its evaluation of northern spotted owl Issue 1. Although this evaluation is not specific to northern spotted owl critical habitat, due to land ownership patterns, large blocks do not form or function on BLM-administered lands in the planning area in isolation from lands outside of northern spotted owl critical habitat, making the Issue 1 analysis relevant to this consideration. Therefore, the BLM needs no additional analysis to address this issue.

Affected Environment and Environmental Effects

As described under northern spotted owl Issue 1, BLM-administered lands in the planning area, including those in critical habitat units, currently contribute to a western Oregon landscape that supports large blocks of contiguous late-successional forest (i.e., nesting–roosting habitat) in all areas except the northern half of the Oregon Coast Range Physiographic Province. In addition, under all alternatives, during the next 50 years, the BLM would continue to contribute to the support and expansion of these large habitat blocks. That said, current habitat conditions in the northern half of the Oregon Coast Range Physiographic Province, along with limited BLM-administered land in that area, preclude the BLM from contributing to a landscape that supports large blocks of late-successional forest in that area at any time during the next 50 years.

Issue Considered, but not Analyzed in Detail

In accordance with Consideration (4) for the western Cascades, Coast Range and moist-forest portions of the Klamath Basin, and in areas that are not currently late seral forest or high-value habitat, and where more traditional forest management might be conducted, would the alternatives apply ecological forestry prescriptions to northern spotted owl critical habitat?

The term, "ecological forestry" is interpreted broadly, as verified by the scientific publications cited by the U.S. Fish and Wildlife Service. In addition, the U.S. Fish and Wildlife Service, in its final rule, acknowledged the site-specific nature of applying ecological forestry: "Specifically prescribing such management is beyond the scope or purpose of this document, and should instead be developed by the appropriate land management agency at the appropriate land management scale (e.g., National Forest or Bureau of Land Management District)… through the land managing agencies' planning processes and with technical assistance from the Service, as appropriate" (77 FR 71881).

The BLM concurs that some applications of ecological forestry depend on site-specific conditions and treatment design; i.e., they are too site-specific or fine-scale for collective evaluation during development of a RMP. In addition, the BLM cannot meaningfully evaluate some components of ecological forestry—such as increasing the amount of forest edge and creating stands that mimic early-seral forest—because there are no scientifically-credible or consensus thresholds against which it could evaluate the alternatives. Finally, the final rule provides no descriptive or quantitative link between "ecological forestry" practices and "those physical and biological features" that are both essential to northern spotted owl conservation and can be evaluated across the planning area.

The BLM interprets "should consider applying" to mean that this consideration is advisory as opposed to one that might cause the BLM to reject an alternative due to an ESA Sec. 9 prohibition.

The BLM determined that its evaluations of northern spotted owl Issues 1 through 4 are more relevant to the question of northern spotted owl conservation, than a separate analysis of the means it would use (specific ecological forestry prescriptions) to foster conservation. Nor would a separate analysis generate results that would help the BLM evaluate its planning alternatives. Therefore, the BLM determined that this issue requires no additional analysis.

Issue Considered, but not Analyzed in Detail

In accordance with Consideration (2) for the Eastern Cascades and dry-forest portion of the Klamath Basin, would the alternatives emphasize vegetation management treatments in northern spotted owl critical habitat that is outside of northern spotted owl territories and highly suitable habitat?

Although this consideration is confined to critical habitat in a portion of the planning area, it advocates locating timber harvest units so as to avoid the northern spotted owl habitat addressed by Recovery Actions 10 and 32 of the Revised Recovery Plan (USDI FWS 2011). As such, the BLM evaluated this consideration under Issue 1, above. Therefore, the BLM determined that this issue requires no additional analysis.

Issue Considered, but not Analyzed in Detail

In accordance with Considerations (3) – (8) for the Eastern Cascades and dry-forest portion of the Klamath Basin, would the BLM, in critical habitat, design and implement restoration treatments at the landscape level, retain and restore key structural components, including large and old trees, large snags, and downed logs, retain and restore heterogeneity within stands, retain and restore heterogeneity among stands, manage roads to address fire risk, and consider vegetation management objectives when managing wildfires, where appropriate?

Resource management plans provide management direction to achieve long-term goals over relatively broad areas but typically defer site-specific (e.g., forest stand management) and landscape-level (e.g., HUC 10 watershed-scale activity plan) decision-making to subsequent implementation actions. For this reason, the alternatives either do not address these considerations or address them indirectly. That said, the U.S. Fish and Wildlife Service, in its narrative on the considerations in its final rule, stated: "Land managers should change from the practice of implementing many small, uncoordinated and independent fuel-reduction and restoration treatments. Instead, coordinated and strategic efforts that link individual projects to the larger objectives of restoring landscapes while conserving and recovering northern spotted owl habitat are needed" (77 FR 71910). As such, the BLM determined that its evaluations of northern spotted owl Issues 1 through 4, 6, and 8, are directly pertinent to demonstrating, and sufficient to demonstrate, the emphasis of each alternative on conserving and recovering the northern spotted owl. Therefore, the BLM determined that this issue requires no additional analysis.

References

USDI FWS. 2011. Revised Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*). USFWS Region 1, Portland, OR. 258 pp. http://www.fws.gov/wafwo/pdf/NSO%20Revised%20Recovery%20Plan%202011.pdf.

Oregon Silverspot Butterfly

Key Points

- All action alternatives would increase the potential for habitat loss for Oregon silverspot butterflies compared to the No Action alternative due to increased access for off-highway vehicles.

Background

The U.S. Fish and Wildlife Service listed the Oregon silverspot butterfly (*Speyeria zerene hippolyta*) as a threatened species under the Endangered Species Act and designated critical habitat on July 2, 1980 (45 FR 44935). Habitat for the Oregon silverspot butterfly includes three types of grasslands: salt-spray meadows on coastal headlands, stabilized dunes, and coastal mountain meadows. Early blue violets or other species of *Viola* are an obligate food source. Violet abundance sufficient to support populations of Oregon silverspot butterfly occurs only in open grassland conditions; groups of violets in small forest clearings are inadequate to support the butterflies (USFWS 2001, 2014) The Oregon silverspot butterfly is known or suspected to occur in five counties in Oregon including Clatsop, Lane, Lincoln, Tillamook, and Yamhill (USFWS 2014). There no observations of this species on BLM-administered lands (GeoBOB 2013).

Threats to the Oregon silverspot butterfly include habitat loss due to commercial or residential development, off-highway vehicle use, excessive livestock grazing, fire suppression, and ecological succession (USFWS 2013, 2001). In the absence of disturbance, open coastal grasslands favorable for abundant violets will develop into shrub land or forest lands through ecological succession and become unsuitable for Oregon silverspot butterflies. Historically, wind erosion, wildfires, fires set by native Americans, and grazing by wildlife maintained habitat for the silverspot butterflies.

Critical habitat for the Oregon silverspot butterfly is located on 438 acres administered by the Siuslaw National Forest (USFWS 2001). There is no designated critical habitat for this species on BLM-administered lands. Therefore, the BLM will not analyze effects to critical habitat for this species further.

Issue 1

What levels of habitat for the Oregon silverspot butterfly would be available under each alternative?

Summary of Analytical Methods

In this analysis , the BLM considered habitat for the Oregon silverspot butterfly to be coastal grasslands/dunes identified in the 2012 GNN as either “California northern coastal grassland,” “Mediterranean California northern coastal dune,” or “north Pacific maritime coastal sand dune and strand” ecological systems within Clatsop, Lane, Lincoln, Tillamook, and Yamhill counties.

Affected Environment and Environmental Effects

There are 19,302 acres of potential coastal grassland/dunes habitat for the Oregon silverspot butterfly in the planning area, of which, 167 acres occur on BLM-administered lands. The BLM does not have site-specific data on habitat conditions of those 167 acres, nor does the BLM know if they are actually providing habitat for the Oregon silverspot butterfly.

Under the No Action alternative, all 167 acres of potential habitat would be designated as *closed* to OHVs. Under the action alternatives, 55 percent of potential Oregon silverspot butterfly habitat would be *closed* to OHVs, and 45 percent would be designated as *limited* to designated roads and trails with possible timing or vehicle restrictions. Alternatives C and D would have 75 acres of habitat designated as *limited* and Alternatives A and B would have 76 acres *limited*. Therefore, the action alternatives would increase the potential for habitat loss due to OHVs, since the designation on 55 percent of habitat would change from *closed* to *limited*.

References

GeoBOB. 2013. BLM OR RWO GeoBOB Publication Fauna Observations Version 3 Point. Data snapshot – 6 March 2013. USDI BLM, Portland, OR.

USDI FWS. 2001. Revised Recovery Plan for the Oregon Silverspot Butterfly (*Speyeria zerene hippolyta*). Portland, OR. 121 pp. http://www.fws.gov/pacific/ecoservices/endangered/recovery/silverspot/default.htm.

---. 2013. Species Fact Sheet: Oregon silverspot butterfly. Last updated: 2 December 2013. http://www.fws.gov/oregonfwo/Species/Data/OregonSilverspotButterfly/.

Oregon Spotted Frog

Key Points

- There would be little discernable difference among the alternatives with regards to impacts from livestock grazing (less than 1 percent of habitat under Alternatives A, B, C, and No Action) on Oregon spotted frog habitat.
- All alternatives would control invasive species infestations (reed canary grass) and avoid development in wetlands that would lead to Oregon spotted frog habitat loss.

Background

The Oregon spotted frog (*Rana pretiosa*) has been lost from 48 of the 61 localities in which it historically occurred, and the species may no longer occur in 76 to 90 percent of its historical range (78 FR 53588). It is currently found in five sub-basins within the planning area: McKenzie River, Middle Fork Willamette, Upper Klamath, Upper Klamath Lake, and Williamson River sub-basins. The U.S. Fish and Wildlife Service proposed to list the Oregon spotted frog as a threatened species under the Endangered Species Act on August 29, 2013.

Oregon spotted frog habitat includes perennial bodies of warm water such as ponds, reservoirs, wetlands, and irrigation canals. They inhabit wetland sites from 2.5 acres in size up to 4,915 acres, although sites greater than 9 acres in size may be necessary to support stable, local. Spotted frogs lay their eggs in wetland areas with low amounts of herbaceous cover, but rarely at bare or rocky sites (USDI FWS 2011). Threats to Oregon spotted frogs include loss of wetland habitat due to human development or conversion to agriculture, livestock grazing, and introduction of nonnative plant and animal species. Heavy livestock grazing can consume and trample riparian vegetation, compact soil in riparian and upland areas, and introduce urine and feces to water sources. The resulting increases in temperature, sediment production, and changes in water quality can negatively affect Oregon spotted frog habitat. Infestations of invasive reed canary grass create dense areas of vegetation that would be unsuitable for spotted frog egg-laying and reduce the biological and structural diversity. Removal or reduction of reed canary grass can improve the quality of the breeding habitat for spotted frogs.

The U.S. Fish and Wildlife Service also proposed to designate critical habitat for the Oregon spotted frog on August 29, 2013 (78 FR 53538).

Issue 1

What levels of habitat for the Oregon spotted frog would be available under each alternative?

Summary of Analytical Methods

In this analysis, the BLM considered habitat for the Oregon spotted frog to be wetlands at least 2.5 acres in size within the five sub-basins in which the species currently occurs. The BLM considered wetlands at least 9 acres in size to be large enough to provide habitat for stable, persistent populations of Oregon spotted frog. Therefore, the BLM characterized wetlands at least 2.5 acres but less than 9 acres in size as small habitat patches, and wetlands at least 9 acres in size as large habitat patches.

Since the U.S. Fish and Wildlife Service identified livestock grazing as a threat, the BLM tabulated how much spotted frog habitat in the decision area was coincident with BLM-administered grazing allotments. BLM consulted the riparian portions of the rangeland health assessments (L. Crumley, BLM, personal communication, 2014) to determine if grazing management in those particular allotments would be contributing adverse effects to spotted frog habitat.

Affected Environment and Environmental Effects

The BLM has documented Oregon spotted frogs in the Klamath Falls Field Office (GeoBOB 2013). There are 155,332 acres of Oregon spotted frog habitat within the planning area, and 96 percent of that habitat occurs in large habitat patches (**Table 3-271**). There are 508 acres of habitat on BLM-administered lands, and 67 percent of that habitat occurs in large habitat patches. The remaining 154,824 acres of habitat in the planning area occurs on lands managed by the private landowners (52 percent), U.S. Fish and Wildlife Service (36 percent), Forest Service (10 percent), the Bureau of Reclamation (1 percent), and other landowners (1 percent). The U.S. Fish and Wildlife Service expects that habitat losses are expected to continue on private lands but at much lower rates than in the past because of Federal and State regulations that pertain to wetlands (USDI FWS 2011).

Table 3-271. Oregon spotted frog habitat in the decision and planning areas.

Oregon Spotted Frog Habitat	Decision Area (Acres)	Planning Area (Acres)
Small Habitat Patches	168	5,516
Large Habitat Patches	340	149,816
Totals	**508**	**155,332**

The BLM would not alter wetland habitat for the Oregon spotted frog through development or conversion to agriculture under any alternative. Similarly among all alternatives, the BLM would strive to prevent the introduction and spread of invasive species on BLM-administered lands. Similarly under all alternatives, the BLM would control invasive species infestations which would benefit spotted frogs and their habitat, through the removal of reed canary grass.

There are 407 acres of spotted frog habitat (69 percent in large habitat patches) within nine grazing allotments in the decision area. Of these nine grazing allotments, the BLM identified only one allotment (Dixie; #00107) as not meeting the rangeland health standards where livestock grazing is a contributing factor (*Appendix K*). Under all alternatives, including the No Action alternative, the BLM must implement management to ensure that progress is being made toward attainment of the standards as soon as is practical but no later than the start of the next grazing season (43 CFR 4180). There are three acres of spotted frog habitat within the Dixie grazing allotment. Under Alternative D, the BLM would eliminate livestock grazing. Under Alternatives A, B, and C, the BLM would reduce the acreage available for grazing by 27 percent (from 495,190 acres to 359,049 acres), but the acreage in allotments that is actively grazed would not change substantially. In 2013, there were 354,633 acres of allotments actively grazed, and the BLM expects this approximate level of grazing would continue under Alternatives A, B, and C and is roughly the same level of active grazing currently under the No Action alternative (L. Crumley, BLM, personal communication, 2014). Therefore, the impacts from livestock grazing on spotted frog habitat in the decision area are limited to three acres of habitat (less than one percent of habitat in the decision area) under all alternatives. There would be no discernable difference in impacts from grazing on the three acres of habitat under all alternatives, and these impacts would not persist beyond the next grazing season.

The U.S. Fish and Wildlife Service has proposed critical habitat for the Oregon spotted frog on 16,715 acres in the planning area, eight acres of which occurs in the decision area on BLM-administered lands in the Klamath Falls Field Office. The three acres of habitat impacted by grazing in the Dixie allotment are not within proposed critical habitat. Therefore, there are no discernable differences among the alternatives in the effects on proposed spotted frog critical habitat.

Overall, there would be little discernable difference among the alternatives concerning impacts from livestock grazing (less than one percent of habitat under Alternatives A, B, C, and the No Action) on Oregon spotted frog habitat. All alternatives would control invasive species infestations (reed canary grass) and avoid development in wetlands that would lead to spotted frog habitat loss.

References

Crumley, L. 2014 (pers. com.). December 14, 2014 e-mail re: acres of vacant allotments. U.S. Department of the Interior, Bureau of Land Management, Lakeview, OR.

GeoBOB. 2013. BLM OR RWO GeoBOB Publication Fauna Observations Version 3 Point. Data snapshot – 6 March 2013. USDI BLM, Portland, OR.

USDI FWS. 2011. U.S. Fish and Wildlife Service species assessment and listing priority assignment form: Oregon spotted frog (*Rana pretiosa*). 5 May 2011. USFWS, Region 1 (Pacific Region). Portland, OR. 60 pp. http://www.fs.fed.us/r6/sfpnw/issssp/documents/planning-docs/cp-fws-candidate-ha-rana-pretiosa-2011-05.pdf.

Vernal Pool Fairy Shrimp

Key Points

- Under all action alternatives, the increase in recreation would have negative effects on vernal pool fairy shrimp habitat through trampling or additional trail development and maintenance.

Background

The U.S. Fish and Wildlife Service listed the vernal pool fairy shrimp (*Branchinecta lynchi*) as a threatened species under the Endangered Species Act on September 19, 1994 (59 FR 48136). At time of its listing, the species was known to occur only in California (USDI FWS 2014). In 1998, additional populations were discovered in vernal pools in Jackson County, Oregon, in the Table Rocks area north of Medford. The U.S. Fish and Wildlife Service designated 5,153 acres of critical habitat for the vernal pool fairy shrimp in 2003 (68 FR 46684); 422 acres is on BLM-administered lands. The BLM manages vernal pool fairy shrimp populations in the Table Rocks area of the Medford District.

Historically, there were 32,000 acres of vernal pool habitat in southern Oregon (USDI FWS 2005), but over 40 percent has been degraded. Threats to vernal pool habitat in Oregon include commercial and industrial development, agricultural conversion, and utility construction/expansion. Specific threats to the vernal pool habitat on BLM-administered lands in the Table Rocks area include trampling in the wet areas near pools from recreation and potential change in subsurface or surface flow runoff patterns due to trail construction or trail improvement.

Issue 1

What levels of habitat for the vernal pool fairy shrimp would be available under each alternative?

Summary of Analytical Methods

In this analysis, the BLM considered habitat for the vernal pool fairy shrimp to be vernal pools as identified in the 2012 GNN as “northern California claypan vernal pool” ecological systems. Given that trampling due to recreation is a threat to habitat on BLM-administered lands, the BLM assumed that changes in OHV use and recreational designations that would increase recreational activities in habitat would have negative effects on that habitat.

The BLM assumed that vernal pool fairy shrimp habitat in areas designated as *open* or *limited* for OHV use, would result in adverse effects to that habitat, and that habitat in areas designated as *closed* to OHV use would be maintained.

Under the action alternatives, the BLM assumed that habitat within designated SRMAs would adversely affect vernal pool fairy shrimp habitat, because recreation would predominate over other resource concerns. The adverse effects to habitat in SRMAs would result from trampling or additional trail development and maintenance that would be allowed in the SRMA. The BLM assumed that designation of habitat within ERMAs would not affect habitat adversely, because recreation management would be done in the context of other resource concerns.

Under the No Action alternative, SRMAs were established where BLM-administered lands were experiencing heavy recreation use or where BLM planned on making large investments in staff, funding, facilities, or time. All remaining BLM-administered lands were an ERMA under the No Action alternative. Management direction does not differ between SRMAs and ERMAs under the No Action alternative. For this analysis, the BLM assumed that SRMAs under the No Action alternative were existing recreation sites or facilities. The BLM assumed that inclusion of habitat within either SRMAs or ERMAs would not affect habitat under the No Action alternative, because recreation management would be done in the context of other resource concerns.

Affected Environment and Environmental Consequences

There are 7,668 acres of vernal pool fairy shrimp habitat within the planning area, of which 307 acres occur on BLM-administered lands. Under the No Action alternative, 95 percent of the habitat and all critical habitat would be closed to OHVs. Alternatives A and B would increase recreation within vernal pool fairy shrimp habitat by changing the designation for OHV use to *limited* on 93 to 100 percent of habitat and critical habitat (**Table 3-272**). Under Alternatives C and D, OHV designations within habitat and critical habitat would not change, and therefore effects from OHVs on vernal pool fairy shrimp habitat would be similar to the No Action alternative.

Table 3-272. Vernal pool fairy shrimp habitat within OHV designations and Recreation Management Areas.

Alternative	Habitat (Acres)	Habitat (Acres)				Critical Habitat (Acres)	Critical Habitat (Acres)			
		OHV Designation		Recreation Management Area			OHV Designation		Recreation Management Area	
		Closed	Limited	SRMA	ERMA		Closed	Limited	SRMA	ERMA
No Action	307	293	14	-	307	422	422	-	-	422
Alt. A		-	307	-	-		-	422	-	-
Alt. B		24	283	-	24		28	394	-	28
Alt. C		293	14	293	-		422	-	422	-
Alt. D		293	14	293	14		422	-	422	-

Under Alternatives C and D, 95 percent of the habitat and all critical habitat would be included in a SRMA where recreation management would predominate. Under Alternative B, 8 percent of the habitat and 7 percent of the critical habitat would be included in an ERMA where recreation management would be done in the context of other resource concerns. Therefore, the BLM concludes that habitat within an ERMA is unlikely to impacted by the RMA designation, since habitat concerns would be considered during recreation management.

Overall, the action alternatives would increase recreational opportunities in vernal pool fairy shrimp habitat through either changes in OHV designations or Recreational Management Area designations. The increase in recreation would have additional negative effects on habitat through trampling or additional trail development and maintenance. Alternatives C and D would have the greatest impact on habitat since recreation would be the predominant use and conservation of vernal pool fairy shrimp would be secondary concerns. Under the No Action alternative, current impacts to vernal pool fairy shrimp habitat (trampling near pools from recreation) would continue.

References

USDI FWS. 2005. Recovery plan for vernal pool ecosystems of California and Southern Oregon. USFWS, Region 1. Portland, OR. http://ecos.fws.gov/docs/recovery_plan/060614.pdf.

---. 2014. Species fact sheet: vernal pool fairy shrimp. Last updated: 28 April 2014. http://www.fws.gov/oregonfwo/Species/Data/VernalPoolFairyShrimp/.

Western Snowy Plover

Key Points

- The action alternatives would increase recreational opportunities in snowy plover habitat through changes in OHV designations, which would have negative effects on plover habitat through additional trail development.

Background

Historically, western snowy plovers *(Charadrius nivosus nivosus)* nested in at least 29 locations on the Oregon coast (USFWS 2013). Currently, only nine locations in Oregon support nesting western snowy plovers (Lauten *et al.* 2013) and two of those areas are on BLM-administered lands (i.e., Coos Bay North Spit and New River). The U.S. Fish and Wildlife Service listed the Pacific Coast distinct population segment of the western snowy plover as a threatened species under the Endangered Species Act on March 5, 1993 (58 FR 12864).

Nesting habitat for the Pacific Coast distinct population segment of the western snowy plover includes coastal beaches comprised of unconsolidated sand with sparse vegetation, from southern Washington to southern Baja California. Threats to snowy plovers include recreational activities (including pedestrians and unleashed pets) near nesting habitat, habitat loss from the encroachment of European beach grass, and predation, particularly from avian predators.

The U.S. Fish and Wildlife Service designated revised critical habitat for the Pacific Coast distinct population segment of the western snowy plover on June 19, 2012 (77 FR 36728). The primary constituent elements of designated critical habitat for the snowy plover include sandy beaches, dune systems immediately inland of an active beach face, salt flats, mud flats, seasonally exposed gravel bars, artificial salt ponds and adjoining levees, and dredge spoil sites, with—

- Areas that are below heavily vegetated areas or developed areas and above the daily high tides;
- Shoreline habitat areas for feeding, with no or very sparse vegetation, that are between the annual low tide or low-water flow and annual high tide or high-water flow, subject to inundation but not constantly under water, that support small invertebrates, such as crabs, worms, flies, beetles, spiders, sand hoppers, clams, and ostracods, that are essential food sources;
- Surf- or water-deposited organic debris, such as seaweed (including kelp and eelgrass) or driftwood located on open substrates that supports and attracts small invertebrates above for food, and provides cover or shelter from predators and weather, and assists in avoidance of detection (crypsis) for nests, chicks, and incubating adults; and
- Minimal disturbance from the presence of humans, pets, vehicles, or human-attracted predators, which provide relatively undisturbed areas for individual and population growth and for normal behavior.

In the Recovery Plan for the Pacific Coast Population of the Western Snowy Plover, the U.S. Fish and Wildlife Service establishes recovery goals to maintain 250 breeding adults along the Oregon and Washington coast for a 10-year period and a ratio of at least 1.0 fledgling per male for the 5-year period prior to delisting (USDI FWS 2007).

Overall, the population of snowy plovers has been increasing since their time of listing in 1993 (**Table 3-273**). Following the 2103 nesting season, the 10-year average for the number of breeding adults is 211 to 216 adults. The number of breeding adults along the Oregon coast has increased between 1993 (55 to 61 adults) and 2013 (190 to 191 adults) (Lauten *et al.* 2013) but is currently below the recovery goal of 250 breeding adults. Lauten *et al.* (2013) suggest that the number of resident plovers is a better index of plover breeding than the number of breeding adults, given the difficulties in positively identifying breeding adults. Based on the number of resident plovers, the population in 2013 has met the recovery goal of 250 breeding adults, if this population can be sustained for nine more years.

Table 3-273. Designated critical habitat for the Pacific Coast distinct population segment of the western snowy plover.

Unit Number	Unit Name	Planning Area Critical Habitat (Acres)	Decision Area Critical Habitat (Acres)
OR 2	Necanicum River Spit	11	-
OR 4	Bayocean Spit	201	-
OR 6	Sand Lake South	5	-
OR 7	Sutton/Baker Beaches	276	-
OR 8a	Siltcoos Breach	15	-
OR 8b	Siltcoos River Spit	116	-
OR 8c	Dunes Overlook/Tahkenitch Creek Spit	383	-
OR 8d	North Umpqua River Spit	59	-
OR 9	Tenmile Creek Spit	223	-
OR 10	Coos Bay North Spit	273	101
OR 11	Bandon to New River	541	282
OR 12	Elk River Spit	167	-
OR 13	Euchre Creek	9	-
	Totals	**2,279**	**383**

The 5-year average for the number of fledglings per male is 1.153 following the 2013 nesting season, which meets the recovery goal of 1.0 fledglings per male (USDI FWS 2007), if it can be sustained while the other goals are attained.

The main cause of nest failure for snowy plovers along the Oregon coast in 2013 was predation by avian predators, particularly corvids (Lauten *et al.* 2013, p. 9). Resprouting and growth of European beachgrass continues to degrade nesting habitat.

Issue 1

What levels of habitat for the Pacific Coast distinct population segment of the Western snowy plover would be available under each alternative?

Summary of Analytical Methods

In this analysis, the BLM considered the Habitat Restoration Areas, as mapped by the Coos Bay District, to represent current habitat for the snowy plover. BLM maintains breeding and wintering habitat in the Habitat Restoration Areas by periodically plowing encroaching beach grass (80 acres in 2012) or augmenting nesting habitat by scattering oyster shells to attract plover nesting (USDI BLM 2012 Coos Bay District APS, p. 14). In this analysis, the BLM assumed that these Habitat Restoration Areas are representative of current plover habitat, based on discussion with Coos Bay District staff (K. Palermo, BLM, personal communication 2014, and S. Fowler, BLM, personal communication, July 2014).

Given that disturbance due to recreational activities is a threat to nesting plovers, the BLM assumed that changes in OHV use and RMA designations that would increase activities in snowy plover habitat, would affect plover habitat.

The BLM assumed that habitat in areas designated as *open* or *limited* for OHV use would result in adverse effects to snowy plover habitat, and that habitat in areas designated as *closed* to OHV use would avoid adverse effects to habitat.

Under the action alternatives, the BLM assumed that designation of habitat within SRMAs would adversely affect snowy plover habitat, because recreation management would predominate over other resource concerns (the Recreation section contains more information). The adverse effects to habitat in SRMAs would result from trampling or additional trail development and maintenance that would be allowed in the SRMA. The BLM assumed that habitat within designated ERMAs would not adversely affect habitat, because recreation management would be done within the context of other resource concerns.

Under the No Action alternative, SRMAs were established where BLM-administered lands were experiencing heavy recreation use or where the BLM planned on making large investments in staff, funding, facilities, or time. All remaining BLM-administered lands were an ERMA under the No Action alternative. Management direction does not differ between SRMAs and ERMAs under the No Action alternative. For this analysis, the BLM assumed that SRMAs under the No Action alternative were existing recreation sites or facilities. The BLM assumed that inclusion of habitat within either SRMAs or ERMAs would not affect habitat under the No Action alternative, because recreation management would be done in the context of other resource concerns.

The BLM did not quantify changes in plover population numbers, because other factors beyond BLM's control influence the population, such as predation by avian predators.

Affected Environment and Environmental Effects

There are currently 334 acres of snowy plover habitat in the planning area; 230 acres are in the decision area on the Coos Bay District. The remaining 104 acres of plover habitat are located on lands managed by the Army Corps of Engineers on the Coos Bay North Spit adjacent to BLM-administered habitat. The BLM assumed in this analysis that habitat conditions and trends on the Coos Bay North Spit are comparable between lands administered by the BLM and Army Corps of Engineers.

There are 2,279 acres of designated critical habitat for the snowy plover in the planning area (**Table 3-274**). There are 383 acres of critical habitat in the decision area, all in the Coos Bay District.

Table 3-274. Western snowy plover habitat within OHV designations and Recreation Management Areas.

Alternative	Habitat	Habitat (Acres)				Critical Habitat	Critical Habitat (Acres)			
		OHV Designation		Recreation Management Area			OHV Designation		Recreation Management Area	
		Closed	Limited	SRMA	ERMA		Closed	Limited	SRMA	ERMA
No Action	230	226	-	23	207	383	348	11	37	346
Alt. A		-	230	-	-		-	383	-	-
Alt. B		-	230	-	72		-	383	-	111
Alt. C		-	230	-	72		-	383	-	111
Alt. D		-	230	-	-		-	383	-	8

Current BLM-administered habitat for the snowy plover is located primarily within designated critical habitat (71 acres in OR 10; 157 acres in OR 11) and 2 acres are located outside of designated critical habitat.

Under the No Action alternative, 98 percent of plover habitat and 91 percent of critical habitat in the decision area would be closed to OHVs. The action alternatives would increase recreation within plover habitat by changing the designation on all habitat and critical habitat to *limited* for OHV use (**Table 3-274**). While the BLM would limit OHV use to designated roads and trails, additional roads and trails could be designated in the future under the *limited* designation, which would increase the recreation footprint and potential disturbance within plover habitat and critical habitat.

Under the No Action alternative, there would be 23 acres of snowy plover habitat and 37 acres of snowy plover critical habitat within SRMAs (**Table 3-274**). The BLM would not designate SRMAs coincident with habitat or critical habitat under the action alternatives. There would be no discernable difference in impacts to snowy plover habitat or critical habitat from Recreation Management Area designations, because recreation management would be done in the context of snowy plovers under all alternatives.

Overall, the action alternatives would increase human recreational opportunities in plover habitat through changes in OHV designations. The BLM expects that the potential increase in OHV recreation would have negative effects on plover habitat through additional trail development.

Issues considered by not analyzed in detail

What levels of habitat for Fender's blue butterfly would be available under each alternative?

The U.S. Fish and Wildlife Service listed Fender's blue butterfly (*Icaricia icarioides fenderi*) as an endangered species under the Endangered Species Act on January 25, 2000 (65 FR 3875). The West Eugene population, which is not within the decision area, includes almost all of the current BLM-administered Fender's blue butterfly sites and critical habitat (USDI BLM 2012). Analysis of the Management Situation for the RMPs for Western Oregon provides more information on the historic range and known populations of Fender's blue butterflies (USDI BLM 2013, p. 135).

Fender's blue butterfly is found exclusively in prairie habitats containing its larval food plants, primarily Kincaid's lupine, but also spur lupine, and occasionally sicklekeeled lupine (USDI FWS 2010, UDSI BLM 2012). These butterflies have limited dispersal ability and remain close to their natal lupine patches when foraging: more than 95 percent of Fender's blue butterflies are found within 33 feet of lupine patches.

The U.S. Fish and Wildlife Service designated critical habitat for Fender's blue butterfly on October 31, 2006 (71 FR 63862). There are 2,180 acres of designated critical habitat for Fender's blue butterfly within the planning area, including on BLM-administered lands in the West Eugene Wetlands, which is outside of the decision area. However, there is no designated critical habitat for Fender's blue butterfly within the decision area. Therefore, the BLM will not analyze effects to critical habitat for this species further.

In this analysis, the BLM considered habitat for Fender's blue butterfly to be native grassland and prairie vegetation within Benton, Lane, Polk or Yamhill County. The BLM tabulated the amount of grassland and prairie habitat acres using Woodstock model output for forests on BLM-administered lands, 2012 GNN structural condition for forest on non-BLM-administered lands, and 2012 GNN ecological systems for non-forest on all lands.

There are 44,762 acres of Fender's blue butterfly habitat within the planning area; 102 acres of which occurs on BLM-administered on the Eugene and Salem Districts. There no observations of this species in the decision area, although there are observations on BLM-administered lands in the West Eugene Wetlands, which is outside of the decision area (GeoBOB 2013).

None of the alternatives would create habitat for Fender's blue butterfly. There is no management direction under any alternatives that would degrade habitat for Fender's blue butterfly outside of the decision area. Therefore, none of the alternatives would affect Fender's blue butterfly habitat quantity or quality.

Appendix R contains additional information and supporting data on Fender's blue butterfly.

What levels of habitat for the Siskiyou Mountains salamander would be available under each alternative?
The Siskiyou Mountains salamander (*Plethodon stormi*) is a Bureau Sensitive species under BLM 6840 policy and is a Survey & Manage species under the current Survey & Manage measures. The U.S. Fish and Wildlife Service received a petition to list the Siskiyou Mountains salamander as a threatened or endangered species on June 16, 2004. On January 24, 2008, the U.S. Fish and Wildlife Service found that the listing of the Siskiyou Mountains salamander was not warranted (73 FR 4380).

Habitat for the Siskiyou Mountains salamander includes talus (loose surface rock), rock slopes, or rock outcrops. This species of salamander may also occasionally use down woody debris for cover but only when in moisture levels are high and it is in close proximity to other rocky substrates. Threats to the Siskiyou Mountains salamander include activities that disturb surface habitat components or the microclimate conditions of the habitat (e.g. timber harvest, road construction, rock pit mining, development of large recreation sites, and wildland fire) (USFS *et al.* 2007). The current, known range of the Siskiyou Mountain salamander includes Jackson and Josephine counties in Oregon and Siskiyou county in California. Within Oregon, Siskiyou Mountains salamanders occur within the Applegate Valley watershed.

On August 16, 2007, the BLM committed to implement a conservation strategy for the Siskiyou Mountains salamander jointly with the Forest Service and the U.S. Fish and Wildlife Service as described in the Conservation Agreement for the Siskiyou Mountains Salamander (Plethodon stormi) in Jackson and Josephine Counties of Southwest Oregon; and in Siskiyou County of Northern California (73 FR 4390; USFS *et al*. 2007). Objectives of this conservation agreement include: 1) establish the extent of known sites; 2) select high-priority known sites for salamander-management; and 3) manage the selected high-priority sites in a manner that will provide viable, well-distributed populations There are 380 sites known for the species and 201 of those sites occur on BLM-administered lands. Through development of the conservation agreement, a panel of scientists and resource managers selected 110 high-priority sites

(4,774 acres) for the Siskiyou Mountains salamander of which 44 high-priority sites (1,950 acres) are on BLM-administered lands.

Consistent with the conservation agreement, draft management direction common to all alternatives is that high-priority sites would be managed to maintain a subpopulation of Siskiyou Mountains salamanders over the long-term (i.e., 100 years) (73 FR 4390; USDA FS *et al.* 2007). The conservation agreement established two strategies to provide for Siskiyou Mountains salamanders, which BLM included as part of draft management direction. The first strategy would maintain habitat conditions for Siskiyou Mountains salamanders at sites without risk of high intensity fire at the site by restricting activities that would have adverse effects on substrate, ground cover, forest condition (e.g. canopy cover) or microclimate. The second strategy would manage sites identified in the conservation agreement with a risk of high intensity fire to reduce fuel loadings within desired conditions to improve Siskiyou Mountains salamander habitat.

High-priority sites for the Siskiyou Mountains salamander would be managed under all alternatives, including the No Action Alternative, for the benefit of the salamanders and their habitat and the BLM expects that these high-priority sites would provide for well-distributed populations. There is no discernable difference in effects on identified high-priority sites among the alternatives.

What levels of habitat for Steller's sea lion would be available under each alternative?

The National Marine Fisheries Service listed the Steller's sea lion (*Eumetopics jubatus*) as a threatened species under the Endangered Species Act on November 26, 1990 (55 FR 49204). The National Marine Fisheries Service designated critical habitat in August 27, 1993 (58 FR 45269). The western distinct population segment of Steller sea lion was listed as endangered on May 5, 1997 (62 FR 24345) but this distinct population segment is located west of 144°W longitude which is approximately 1,000 miles offshore from the planning area. The planning area is within the range of the eastern distinct population segment (east of 144°W longitude), and the eastern distinct population segment of Steller's sea lion was delisted on November 4, 2013 (78 FR 66140).

The eastern distinct population segment of Steller sea lion is not in danger of extinction or likely to become so within the foreseeable future. The eastern population increased from 18,313 animals in 1979 to 70,140 animals in 2010; annual population growth of 4.18 percent. The National Marine Fisheries Service concluded that human disturbance of Steller's sea lions on or near coastal habitats is not likely to cause the eastern distinct population segment of Steller's sea lion to become in danger of extinction throughout all or a portion of its range within the foreseeable future. Coastal development, recreation, and human population growth may lead to more disturbances of Steller sea lions on terrestrial sites or in the water. However, protections against such disturbance exist, and will likely remain in place, under a variety of State and Federal statutes such as the Marine Mammal Protection Act.

Although rookeries and haul-out sites for Steller's sea lion could occur on BLM-administered lands adjacent to the Pacific Ocean, there is no basis to conclude that any BLM management under any of the alternatives would adversely affect Steller's sea lions or their habitat.

What levels of habitat for the streaked horned lark would be available under each alternative?

The U.S. Fish and Wildlife Service listed the streaked horned lark (*Eremophila alpestris strigata*) as a threatened species under the Endangered Species Act on October 3, 2013 (78 FR 61452). The Analysis of the Management Situation for the RMPs for Western Oregon provides more information on the historic range and known populations, which is incorporated here by reference (BLM 2013). The U.S. Fish and Wildlife Service designated critical habitat for the streaked horned lark on October 3, 2013 (78 FR 61506). All designated critical habitat in the planning area is on the Willamette Valley National Wildlife

Refuge Complex administered by the U.S. Fish and Wildlife Service. Therefore, no BLM actions would have an effect on critical habitat for this species.

In this analysis, the BLM considered habitat for the streaked horned lark to be open areas of non-forest at least 300 acres in size, within grassland and prairie vegetation, within Benton, Clackamas, Clatsop, Columbia, Lane, Linn, Marion, Multnomah, Polk, Washington, or Yamhill Counties (78 FR 61459). The BLM tabulated the amount of open habitat acres using Woodstock model output for forests on BLM-administered lands, 2012 GNN structural condition for forest on non-BLM-administered lands, and 2012 GNN ecological systems for non-forest on all lands.

There are 1,400,297 acres of streaked horned lark habitat within the planning area, but none occurs in the decision area . There no observations of this species on BLM-administered lands (GeoBOB FaunaObs, March 6, 2013).

None of the alternatives would create streaked horned lark habitat within the decision area. There is no management direction under any alternatives that would degrade streaked horned lark habitat outside of the decision area. Therefore, none of the alternatives would affect streaked horned lark habitat quantity or quality.

Appendix R contains additional information and supporting data on streaked horned lark.

What levels of habitat for Taylor's checkerspot butterfly would be available under each alternative?

The U.S. Fish and Wildlife Service listed Taylor's checkerspot butterfly (*Euphydras editha taylori*) as an endangered species under the Endangered Species Act on October 3, 2013 (78 FR 61452). Within the planning area, this butterfly species was historically found throughout grasslands in in the Willamette Valley but the current range in the planning area is reduced to Benton County (78 FR 61452). Analysis of the Management Situation for the RMPs for Western Oregon provides more information on the historic range and known populations (BLM 2013, p. 144). The primary threat to Taylor's checkerspot butterfly is loss, conversion, and degradation of habitat due to agricultural and urban development, successional changes to grassland habitat, and invasive plants (78 FR 61473).

The U.S. Fish and Wildlife Service designated critical habitat for the Taylor's checkerspot butterfly on October 3, 2013 (78 FR 61506). The U.S. Fish and Wildlife Service designated 20 acres in Oregon, all on private lands (78 FR 61524). Therefore, the BLM will not further analyze effects on critical habitat.

In this analysis, the BLM considered habitat for Taylor's checkerspot butterfly to be grassland and prairie vegetation within Benton County. The BLM tabulated the amount of grassland and prairie habitat acres using Woodstock model output for forests on BLM-administered lands, 2012 GNN structural condition for forest on non-BLM-administered lands, and 2012 GNN ecological systems for non-forest on all lands.

There are 6,648 acres of Taylor's checkerspot butterfly habitat within the planning area, of which only 2 acres occurs on BLM-administered lands in the Salem District. There no observations of this species on BLM-administered lands (GeoBOB FaunaObs, March 6, 2013).

There is no management direction under any alternative that would degrade grassland habitat for Taylor's checkerspot butterfly. Given the narrow range of habitat for Taylor's checkerspot butterfly (i.e., grassland) and its limited spatial extent on BLM-administered lands, habitat availability for Taylor's checkerspot butterfly would not vary among the alternatives.

Appendix R contains additional information and supporting data on Taylor's checkerspot butterfly.

What levels of habitat for the wolverine would be available under each alternative?

The U.S. Fish and Wildlife Service proposed the wolverine (*Gulo gulo*) as a threatened species under the Endangered Species Act on February 1, 2013 (78 FR 7864). Wolverine habitat is dependent on high-elevation areas that are cold and receive enough winter precipitation to maintain snow late into the spring; wolverines are dependent on that spring snow cover for successful reproduction. Wolverine habitat does not appear to be restricted to specific vegetation or other structural characteristics.

Human use and disturbance may have an impact on wolverine behavior. However, little is known about the behavioral responses of individual wolverines to human presence, or about the species' ability to tolerate and adapt to repeated human disturbance. The U.S. Fish and Wildlife Service does not consider stressors such as recreation, infrastructure development, or transportation corridors to pose a threat to wolverines. There is no evidence to suggest that land management activities are a threat to the conservation of the wolverine.

Future climate change, with reduced snowpack, earlier spring thaw, and warmer summer temperatures, is the only projected threat to wolverine habitat. These changing conditions will reduce wolverine habitat and increase fragmentation of remaining habitat.

The BLM considered habitat for the wolverine to be all lands at least 4,592 feet in elevation within the Cascades Province. There are 1,570,784 acres of wolverine habitat within the planning area, of which 59,311 acres is in the decision area. There no observations of this species on BLM-administered lands (GeoBOB FaunaObs, March 6, 2013).

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Wild Horses

Key Points

- The Pokegama herd is currently within the appropriate management level of 30 to 50 horses.
- The Pokegama herd relies primarily on private land within the Herd Management Area.
- Alternative D, which would eliminate livestock grazing, would reduce competition for forage and provide the potential for increased growth of the Pokegama herd. Otherwise, the alternatives would not differ in their effects on the Pokegama herd.

Background

The Pokegama Herd Management Area (HMA) is the only HMA within the planning area. It encompasses a total of 85,022 acres in Oregon and California and includes private, state, and Federal lands. About 83 percent of the HMA (70,550 acres) is within the planning area, and about 23 percent of the HMA is on BLM-administered lands managed by the Klamath Falls Field Office. The remainder of the HMA within the planning area is on private land. Most of the California portion of the HMA (95 percent, or 13,016 acres) is located on private and state land; only 5 percent is located on BLM-administered lands (outside of the planning area).

The Pokegama herd primarily occupies the private land within the HMA. Private landowners allow wild horses on their lands, if the herd size is maintained within the established appropriate management level, and that the horses do not range outside the HMA.

The Pokegama herd spends 94 percent of its time in meadows, open areas, and in tree cover on the edge of meadows (Gottlieb 1993). During the spring and summer, the horses are generally in the northern and central portions of the HMA. Due to the typically high winter snow accumulations in the northern and central portions of the HMA, the horses concentrate in the southern portion (California) from December through March, although they can be found there at any time of the year.

The diet of the Pokegama herd is predominantly grasses and grass-like species. Their primary water sources include creeks, springs, and reservoirs. Most developed water sources for the Pokegama herd (70-80 percent) are on private land. The BLM and private landowners have constructed several exclosures to protect riparian areas from wild horses.

The Pokegama Wild Horse Herd Management Area Plan (USDI BLM 2002) identifies specific management objectives and actions for the management of the Pokegama HMA.

Issue 1

How would the alternatives affect BLM's ability to maintain the Appropriate Management Level of 30 to 50 wild horses within the Pokegama Herd Management Area?

Summary of Analytical Methodology

The BLM qualitatively analyzed effects to wild horses within the Pokegama HMA, based on other resource management programs. Wild horses in the Pokegama Herd would be managed the same under all alternatives. The management plan for the HMA is currently being revised and guides BLM management activities in the HMA.

This analytical approach is a change from the Planning Criteria, which described analyzing changes in forage availability based on changes in forest structural stages (USDI BLM 2014, pp. 170-171). The alternatives would result in negligible differences in the acreage of non-forest, early-successional, and stand establishment forest within the HMA. In addition, a 2014 wildfire in the HMA has had a much greater influence on forest structure within the HMA than any potential changes under each of the alternatives.

Affected Environment

The Pokegama herd is currently within the appropriate management level of 30 to 50 horses, based on the HMA management plan. Since designation of the HMA in 1971, census counts of the Pokegama wild horse population have ranged from 25 in 1972 to 55 in 2000 (**Figure 3-209**). The 2012 census counted 24 horses, although the BLM estimates the current herd size is 30 to 40 horses.[112] The BLM completed captures in 1996 and 2000, removing 20 and 18 horses, respectively.

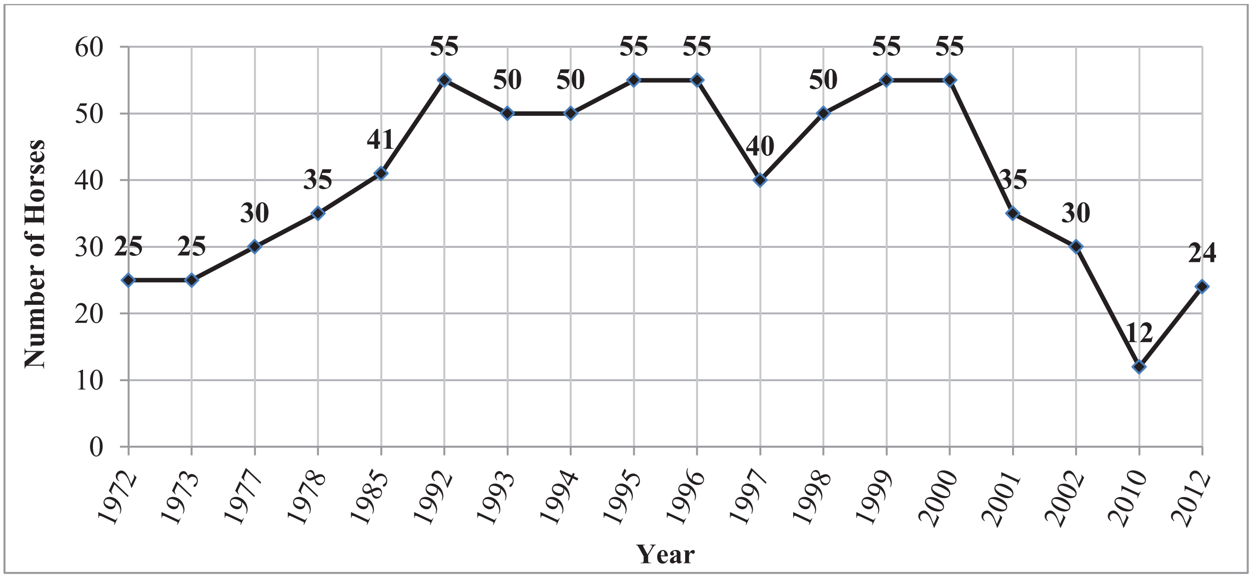

Figure 3-209. Pokegama herd census, 1972-2012.

The average growth rate for the Pokegama herd is 4-5 percent per year, which is below the average rate of 20 percent for other wild horse herds. The lower growth rate for the Pokegama herd may be related to a higher ratio of male to female horses than is normally found in wild horse herds (Gottlieb 1993). The lower growth rate may also be related to young horses being killed by mountain lions during the winter or being illegally removed (USDI BLM 2002). The overall condition of the herd is excellent (USDI BLM 1996 and 2002).

The portion of the HMA within the planning area lies within the boundaries of two grazing allotments: the Dixie and Edge Creek allotments. There is abundant forage and available water within the two allotments in the HMA. Forage is allocated for livestock, wild horses, deer, and elk (USDI BLM 1994).

[112] The BLM estimates that actual horse numbers are 25 to 50 percent higher than census counts, due to difficulty of counting animals on forested landscapes.

The BLM allocates 150 animal unit months of forage on BLM-administered lands to the Pokegama herd, based on the proportion of BLM-administered lands in the HMA. The Pokegama herd requires approximately 600 animal unit months of forage a year.

Environmental Effects

Vegetation management actions under the alternatives would have very little if any effect on wild horses in the HMA. All alternatives would manage all or most of the forested areas in the HMA with uneven-aged management. Unlike all other alternatives, Alternative C includes two small areas of HITA within the HMA, in which timber management actions would include clearcuts. This increased intensity of timber management under Alternative C could result in some increase in forage over time. However, the small acreage would render this overall effect negligible in the context of the entire HMA.

Vegetation management actions, road maintenance and construction, recreation areas, and travel management designations for OHV use could affect wild horse movements, the habitat they occupy, and associated available forage. These activities would have only temporary and localized effects on horse distribution and movement with the HMA, which cannot be quantified at this scale of analysis with the data available.

There is a proposed ACEC within the HMA, which is currently fenced. The designation of this area as an ACEC would not affect the wild horse herd, because the horses have no access.

Alternative D would eliminate livestock grazing and would reduce competition for forage within the HMA. Alternative D would increase the animal unit months of forage available to horses by 627. This increase in forage would provide sufficient forage to support a horse population at the high end of the appropriate management level on BLM-administered lands alone. This elimination of direct competition to horses within the HMA would provide the potential for increased growth of the Pokegama herd.

References

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Wild and Scenic Rivers

Key Points

- Under the Common to All Alternatives, the 12 river segments found suitable for inclusion into the National Wild and Scenic Rivers System through the previous western Oregon RMPs (1995) are carried forward as suitable in this plan.
- Under the No Action Alternative, all 51 eligible Wild and Scenic River segments would continue to be managed as eligible, protecting the rivers and their associated values, until suitability determinations are made.
- Under Alternative A, the BLM would not designate as suitable any of the 51 eligible Wild and Scenic River segments, resulting in effects to all eligible river segments and their associated values.
- Under Alternatives B and C, the BLM would designate as suitable six eligible Wild and Scenic River segments, resulting in protection for those six segments, non-suitable determinations for the remaining 45 rivers would result in effects to those segments and their associated river values.
- Under Alternative D, the BLM would designate as suitable all 51 eligible Wild and Scenic River segments, resulting in the greatest protection for all segments and their associated river values.

Issue 1

How would the proposed management actions in each alternative affect identified Outstandingly Remarkable Values, water quality, tentative classification, and free-flowing condition on eligible Wild and Scenic River segments in western Oregon?

Summary of Analytical Methods

The BLM established impact indicators based on key resources to measure the effects that the management actions associated with each alternative would have on the Outstandingly Remarkable Values (ORVs), water quality, free-flowing characteristics and tentative classification of eligible segments.

The Planning Criteria provides additional information on analytical assumptions, methods and techniques, and geographic and temporal scales, which the BLM incorporates here by reference (BLM 2014, pp. 120-122).

Descriptions of Indicators Used for Analysis

The effect of the alternatives on eligible river segments is assessed by considering the extent to which each alternative protects four factors: the ORVs, water quality, free-flowing characteristics, and tentative classification. These factors are protected for a given eligible segment when that segment is administratively designated as suitable in an alternative; these factors are left unprotected when a particular segment is not administratively designated as suitable and when the eligible status is dropped (in all action alternatives, segments not administratively designated as suitable are also no longer protected as being eligible). Where an alternative does not protect a particular segment, the analysis considers the potential effect of other management on the four factors.

Several key resources will be used to determine effects to ORVs. Impact indicators include: 1) Recreation Management Areas, ACECs, riparian, forest management and Visual Resource Management (VRM) designations; and (2) establishing limitations for lands and minerals resources (e.g., timing limitations, establishing no surface occupancy stipulations, establishing right-of-way exclusion areas).

Effects Analysis Assumptions

- A no surface occupancy stipulation generally provides protection by prohibiting surface occupancy and surface-disturbing activities that might degrade or continue degradation of the ORVs, and by preventing projects that might affect the tentative classification (i.e., wild, scenic, or recreational) or free-flowing nature of the segment.

- A controlled surface use stipulation would provide a slightly lesser degree of protection to the Wild and Scenic River characteristics, as surface-disturbing activities are allowed, but must be modified or moved so as not to affect the resource.

- Timing limitation stipulations provide a similar level of protection as no surface occupancy, but only during certain times of the year. These are especially important in protecting aquatic and terrestrial wildlife species and their habitat during critical times. The acres affected by each type of stipulation are detailed under each alternative as follows.

- Non-native invasive weed treatments in the short term may affect ORVs or tentative classification as evidence of human activity may be seen. In the long-term, weed treatment and eradication would benefit ORVs as riparian health improves.

- Wild and Scenic River segments with scenic ORVs, VRM Class I and II management would provide the most protection to the scenic ORV. VRM Class I and II management may also provide indirect protection for other ORVs or tentative classification by preventing certain types of development that would affect the ORVs or tentative classification.

- For Wild And Scenic River segments with scenic ORVs, VRM Class III and IV management would most likely lead to effects on scenic ORVs by allowing development that would directly impair scenic quality. VRM Class III and IV management may also indirectly affect other ORVs or tentative classification by allowing certain types of development.

- Increased recreation has the potential to affect ORVs associated with each segment. Building infrastructure to keep people away from sensitive resources could mitigate impacts. Closing areas to motorized travel would protect areas from impacts associated with such use. Designating routes for motorized uses would help protect ORVs to a lesser degree.

- Where Wild and Scenic River segments overlap ACECs, ACEC management would complement Wild and Scenic River objectives.

- Where the BLM would designate a segment as suitable under a particular alternative, the BLM would actively protect these characteristics; this analysis assumed that this protection would result in the continued maintenance of the ORVs, water quality, free-flowing characteristics, and tentative classification for at least the life of the plan.

- The corridor width for suitable or eligible rivers cannot exceed an average of 320 acres per mile, which if applied uniformly along the entire river segment, is one-quarter mile on each side of the rivers from the high water mark. For analysis purposes, the affected river corridors are 0.25 mile from the high water mark on both sides of the river.

Background

Wild and Scenic Rivers (WSRs) are rivers or river sections designated by Congress under the authority of the Wild and Scenic Rivers Act of 1968 (WSR Act) (16 U.S.C. 1271 *et seq.*). Congress designates rivers under this act for the purposes of preserving the river or river section in its free-flowing condition, preserving water quality, and protecting its ORVs. River segment ORVs may include scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values.

Congress classifies all designated Wild and Scenic River segments as wild, scenic, or recreational. These classifications are also applicable to suitable and eligible river segments, which are described below. Definitions of these classifications are the following:

- **Wild river segments**. Wild river segments are free of impoundments and generally inaccessible, except by trail. Their watersheds or shorelines are essentially primitive and their waters unpolluted. These represent vestiges of primitive America.
- **Scenic river segments**. Scenic river segments are free of impoundments. Their shorelines or watersheds are largely primitive and undeveloped, but their shorelines are accessible in places by roads. Limited timber harvesting may take place.
- **Recreational river segments**. Recreational river segments are readily accessible by road or railroad. They may have some development along their shorelines and may have undergone some impoundment or diversion in the past. Limited timber harvesting may take place.

Section 5(d)(1) of the WSR Act directs Federal agencies to consider potential WSRs in their land use planning process. To fulfill this requirement, the BLM inventories and evaluates rivers when the BLM develops or revises resource management plans. In order to fulfill the WSR Act Section 5(d)(1) obligations, the BLM is considering potential WSR segments within the planning area as part of this planning process.

In order to be eligible for inclusion into the National Wild and Scenic River System, a river segment must be free-flowing and contain at least one river-related value considered to be outstandingly remarkable (BLM Manual 6400 – Wild and Scenic Rivers, USDI BLM 2012). An eligible river's ORVs should be located in the river itself or on its immediate shore lands. Whether management decisions or actions that would affect individual resources or resource uses affect an eligible river depends on the segments qualifying ORVs and tentative classification. Eligible segments are preliminarily classified as wild, scenic, or recreational based primarily on level of development (shoreline and in stream) accessibility and water quality.

Each eligible river segment is further evaluated to determine whether it is suitable for inclusion into the National System. The suitability analysis provides the basis for determining which rivers to recommend to Congress as potential additions to the National System. A suitable river is an eligible river segment found through administrative study to meet criteria for designation as a component of the National System, as specific in Section 4(a) of the WSR Act. The following questions are addressed when evaluating suitability:

- Should the river's free-flowing condition, water quality, and outstandingly remarkable values be protected, or are one or more other uses important enough to warrant doing otherwise?
- Will the river's free-flowing condition, water quality, and outstandingly remarkable values be protected through designation?
- Is designation the best method for protecting the river corridor?
- Is there a demonstrated commitment to protect the river by any non-Federal entities that may be partially responsible for implementing protective management?

The BLM must provide permanent protection of designated wild and scenic rivers. Interim protection is required for eligible and suitable river segments, until either—

- The BLM determines, through a suitability study, that an eligible river segment is unsuitable for inclusion as a Wild and Scenic river; or
- Congress adds or precludes the addition of a suitable river segment to the National Wild and Scenic River System.

The BLM's protective management of eligible and suitable river segments includes managing the segments for the protection of their ORVs, water quality, free-flowing characteristics, and tentative classification. The BLM is also obligated to protect the water quality necessary to support the ORVs.

For permit applications under BLM authority, the BLM does not permit projects that would adversely affect the ORVs, water quality, free-flowing characteristics, and tentative classification of eligible and suitable segments. Other Federal agencies considering permit applications (not under BLM authority) that could affect the resources associated with the six suitable river segments are required to seek formal comments from the BLM.

River Designations that will not be Affected by this Planning Effort

Previous planning efforts (1995 Resource Management Plans for Western Oregon) analyzed river segments as potential Wild and Scenic Rivers. This analysis found river segments to be eligible, ineligible, or not suitable for inclusion into the National System. A revalidation effort found these determinations unchanged.

Of the 78 designated, suitable, and eligible Wild and Scenic River segments:

- 9 are designated
- 12 are suitable for recommendation to Congress
- 51 are eligible and currently being studied for suitability and will be affected by this planning effort (described further below under Affected Environment)

Designated Rivers in the National Wild and Scenic Rivers System

The BLM administers nine designated Wild and Scenic Rivers within the planning area (**Table 3-275**). These rivers are designated by Congress or the Secretary of the Interior for the preservation of the ORVs, water quality, free-flowing characteristics, and tentative classification.

Table 3-275. Designated Wild and Scenic Rivers within the planning area.

Designated River Name	District/Field Office	Classification	River Miles
Clackamas	Salem	Recreational	0.5
Elkhorn Creek	Salem	Wild/Scenic	3.0
North Umpqua	Roseburg	Recreational	8.4
Quartzville Creek	Salem	Recreational	9.7
Rogue	Medford	Wild/Recreational	47.0
Salmon	Salem	Scenic/Recreational	8.0
Sandy	Salem	Scenic/Recreational	12.5
South Fork Clackamas	Salem	Wild	0.6
Upper Klamath	Klamath Falls	Scenic	11.0
		Totals	**100.7**

Current Suitable Wild and Scenic River Segments

Under the 1995 RMPs, the BLM found 13 river segments suitable (**Table 3-276**). The BLM currently manages these segments under interim protection until Congress designates the river segment or releases it for other uses. During this current planning process, the BLM revalidated the finding of suitability for these 13 river segments. These segments are incorporated by reference and they are not affected by any of the action alternatives.

Table 3-276. Suitable Wild and Scenic Rivers within the planning area.

River Segment Name	District	Wild and Scenic River Classification	River Miles
Big Windy Creek Segment A	Medford	Rec/Scenic	1.6
Big Windy Creek Segment B	Medford	Rec/Scenic	5.7
Dulog Creek Segment A	Medford	Rec/Scenic	0.5
Dulog Creek Segment B	Medford	Rec/Scenic	0.9
East Fork Big Windy Creek Segment A	Medford	Rec/Scenic	0.2
East Fork Big Windy Creek Segment B	Medford	Rec/Scenic	3.6
Howard Creek Segment A	Medford	Rec/Scenic	0.7
Howard Creek Segment B	Medford	Rec/Scenic	6.8
McKenzie River Segment B	Eugene	Fish/Scenic	36.7
Molalla River Segment B	Salem	Geo/Rec/Scenic	13.5
Nestucca River Segment A	Salem	Fish/Rec/Scenic/Wild	13.1
Siuslaw River Segment B	Eugene	Fish/Wild	46.3
Siuslaw River Segment C	Eugene	Rec/Wild	11.7
		Totals	**141.3**

Affected Environment

Eligible Wild and Scenic River Segments and Associated Values

Under the 1995 RMPs, the BLM found 51 river segments eligible. These segments are currently managed under interim protection until the BLM makes land use plan decisions regarding their suitability. As part of the current planning effort, the BLM studied these 51 eligible segments for suitability. While suitability determinations can only be made through a land use plan, the BLM identified six segments that the BLM believes meet the suitability criteria for inclusion in the National Wild and Scenic River System. The Draft Suitability Report and subsequent determinations are located in http://www.blm.gov/or/plans/rmpswesternoregon/recreation.php and are incorporated here by reference.

Table 3-277 identifies these six segments, their ORVs, segment length, and the acreage under BLM administration. **Table 3-278**lists the river segments identified as suitable.

Table 3-277. Eligible Wild and Scenic Rivers within the planning area.

Study River Name	Outstandingly Remarkable Values	Miles	BLM-administered Lands (Acres)
Alsea River	Fish, Recreation	16.5	404
Antelope Creek	Fish	21	718
Applegate River	Fish	48	839
Big Butte Creek	Fish	12	706
Cheney Creek	Fish	7	710
Clackamas River	Recreation, Fish	15.4	30
Cow Creek	Fish	61	3339
Drift Creek	Fish	30.1	150
Elk Valley Creek	Fish	6	464
Fall Creek - Eugene	Recreation	2	87
Fall Creek - Salem	Fish	11.7	670
Kilches River	Fish, Recreation	15.7	66
Lake Creek	Fish, Recreation	19.4	483
Left Fork Foots Creek	Fish	4	131
Little Applegate River	Fish	23	1367
Little Luckiamute River	Ecology	27.1	40
Little North Santiam River	Fish, Recreation, Scenery	17.2	1,205
Lobster Creek	Fish	16.6	352
Luckiamute River	Cultural, Ecology	61.2	623
McKenzie River	Fish, Recreation, Scenery	48.7	1,203
Middle Santiam River	Cultural, Ecology	7.9	193
Nehalem River	Recreation, Fish	123.6	40
Nelson Creek	Fish	9.7	833
Nestucca River Segment B	Recreation, Wildlife	8	212
North Fork Clackamas River	Fish	14.4	389
North Fork Gate Creek	Fish	1.7	199
North Fork Siletz River	Fish, Recreation, Scenery	66.2	54
North Fork Trask River	Fish, Recreation	19.5	444
North Santiam River	Fish, Recreation, Scenery	46	375
Quines Creek	Fish	7	816
Riffle Creek	Fish	6	762
Rogue River	Fish, Recreation	63	708
Sams Creek	Fish	8	497

Study River Name	Outstandingly Remarkable Values	Miles	BLM-administered Lands (Acres)
Sandy River	Recreation, Fish Cultural, Scenery	26.3	1519
Siletz River	Fish, Recreation, Scenery	66.2	54
Sixes River	Fish, Historic	28.9	281
South Fork Coos River	Fish, Recreation	31.6	551
South Fork Coquille	Fish, Prehistoric	35.2	152
South Fork Gate Creek	Fish	2.1	108
South Fork Little Butte Creek	Fish	24.5	452
South Fork Trask River	Fish	9.3	69
South Umpqua	Cultural, Fish, Historic, Wildlife	75.2	602
South Yamhill River	Cultural, Ecology	62.5	0
Table Rock Fork – Molalla River	Cultural	13.4	1,480
Trask River	Fish, Recreation, Wildlife	19.5	444
Tualatin River	Cultural	80.4	326
Umpqua River	Fish, Geologic, Historic, Prehistoric, Recreation, Scenery	109.5	2,403
West Fork Illinois River	Scenery	17	1154
Willamette River	Cultural, Ecology, Fish, Recreation, Wildlife	161.3	83
Wilson River	Fish, Recreation, Wildlife	30.8	108
Yaquina River	Fish	54.38	269
	Totals	**1,692.7**	**29,378**

Table 3-278. Eligible rivers that the BLM identified as meeting suitability criteria.

River Segment Name	District	Wild and Scenic River Classification	River Miles
Little North Santiam River	Salem	Recreational	17
North Fork Siletz	Salem	Scenic	11
Rogue River	Medford	Recreation	63
Sandy River	Salem	Recreation	26
Table Rock Fork Molalla	Salem	Recreation	13
West Fork Illinois	Medford	Scenic	17
		Totals	**147**

Environmental Effects

This section analyzes the environmental impacts to WSRs within the decision area that could result from the implementation of the management actions proposed under the four alternatives in relation to other resources and resource uses. This analysis is two-part; 1) effects resulting from WSR determinations under each alternative; and 2) effects to segments not managed as suitable under the alternatives from management of other resources. Because of WSR determinations, those study rivers that were determined non-suitable, by alternative, are analyzed to determine the effects to the identified ORVs, water quality, free-flowing characteristics, and tentative classification on non-suitable study rivers.

Effects on Designated Wild and Scenic Rivers

All designated WSR segments have their own comprehensive river management plans providing management meeting the intent of the WSR Act. This planning effort has no bearing on these segments other than these plans being incorporated by reference.

River Segments for which the BLM has Previously Made Suitability Decisions

The BLM will continue to manage these segments to protect their components until Congress either designates them or releases them for other purposes. This planning effort has no bearing on these segments other than decisions from the 1995 RMPs being incorporated by reference.

River Segments Currently Identified as Eligible

The analysis of management and subsequent effects for WSRs is limited to river segments currently identified as eligible. This analysis focused on the effects of the alternatives on the 51 river segments within the planning area that are currently designated as eligible and for which the BLM is considering a range of suitability determinations. While the BLM has identified six of these segments as meeting the suitability requirements (Wild and Scenic River Suitability Report at http://www.blm.gov/or/plans/rmpswesternoregon/recreation.php), in conformance with direction and related agency guidance in the WSR Act, this Draft RMP/EIS analyzes a full range of alternatives for the designation of suitable segments.

As described in the analytical methodology section, the BLM considered the effect of each alternative's suitability designations and the potential effects from the management of other resources on each segment's ORVs, water quality, free-flowing characteristics, and tentative classification.

Where the BLM would not designate a particular segment as suitable under a given alternative that segment would no longer have administrative protections. In this analysis, the BLM will refer to such segments as "not suitable." The BLM would manage such segments under prescriptions for other resource programs. Management for other programs could be either detrimental or indirectly protective of each segment's ORVs, water quality, free-flowing characteristics, and tentative classification.

The BLM assumed that management for the following resources would have negligible effects on not suitable segments under all of the alternatives: air and atmospheric values (air quality), vegetation (forest and woodlands, riparian; rangelands), fish and wildlife, Special Status Species (plants), cultural resources, paleontology resources, lands with wilderness characteristics outside existing Wilderness Study Areas, energy and minerals (coal), ACECs, transportation system management, and public health and safety.

Effects to Currently Eligible Rivers Resulting from WSR Determinations (Suitable and Eligible Determinations)

As described in more detail below, the No Action alternative and Alternative D would provide the most protection for the 51 current eligible river segments and their associated characteristics. While the No Action alternative would not meet the BLM's policy requirement to consider the suitability of eligible segments, it would continue protective management of all segments and their values, as would Alternative D's determination that all 51 segments are suitable. Alternative A would provide no protective management for eligible rivers. Alternatives B and C would provide protective management for six rivers. **Table 3-279** compares the miles and acres of eligible Wild and Scenic Rivers that would be protected across all action alternatives. **Table 3-280** compares the acres of eligible rivers that would receive protective management based on their finding of suitability.

Table 3-279. Wild and Scenic River protection totals across range of alternatives.

Alternative	Eligible Rivers Determined Suitable (Number of Segments)	Protected River Miles (Total Miles)	Protected River Acres (Total Acres)
No Action	-	-	-
Alt. A	-	-	-
Alt. B	6	147	6,120
Alt. C	6	147	6,120
Alt. D	51	1,692.7	29,164

Table 3-280. Suitable river segments receiving protection from minerals and right-of-way management under applicable action alternatives.

Alternative	Suitable River Segments (Number)	Stipulation (Acres)	Right-of-way (Acres)		Recommended for Withdrawal From Locatable Mineral Entry (Acres)	Closed to Salable Mineral Development	Total BLM Acres
		No Surface Occupancy, Controlled Surface Use, Timing Limitation	Exclusion	Avoidance			
Alt. B	6	7,143	806	6,337	7,143	7,143	7,143
Alt. C	6	7,143	806	6,337	7,143	7,143	7,143
Alt. D	51	29,378	806	28,573	29,378	29,378	29,378

No Action Alternative

Under the No Action alternative, the BLM would continue to manage the 51 segments identified as eligible during the 1995 RMP process to protect their ORVs, water quality, free-flowing characteristics, and tentative classification as wild, scenic, or recreational until suitability is determined on the 1693 river miles and 29,378 acres within the study river corridors. Under this protective management, the BLM would not approve any action that would adversely affect the 51 segments' ORVs, water quality, and free-flowing characteristics, and the BLM assumes that these characteristics would persist for at least the life of the plan.

Alternative A

Under Alternative A, the BLM would determine that all 51 eligible river segments in the planning area are not suitable for inclusion into the National Wild and Scenic Rivers System. The BLM would no longer manage these 1,693 river miles and 29,378 acres of land to protect their ORVs, water quality, free-flowing characteristics, and tentative classification.. The BLM assumed that removing protective management would result in long-term adverse impacts to the ORVs, water quality, free-flowing characteristics, and tentative classification identified during the eligibility assessments. The BLM describes the effects of management for other resources on these non-suitable segments below.

Alternatives B and C

Under Alternatives B and C, the BLM would determine that six segments (**Table 3-279**) are suitable for inclusion into the National Wild and Scenic Rivers System. The BLM would continue to manage these six segments, totaling 7,143 acres and 149 river miles, to ensure the continued protection of their ORVs, water quality, free-flowing characteristics, and tentative classification until Congress makes a determination whether to designate the segment(s) as part of the National Wild and Scenic River System.

This protective management would include requiring mineral leasing stipulations to protect WSR characteristics, recommending to withdraw suitable segment corridors from locatable mineral entry, closing suitable segment corridors to salable mineral development, managing suitable river segments as VRM II, and managing as ROW avoidance areas. **Table 3-280** shows the suitable river segments receiving protection from minerals and rights-of-way management.

Compared with Alternative A, Alternatives B and C provide more protection to WSR characteristics based on the establishment of minerals and rights-of-way restrictions. Compared with Alternative D, Alternatives B and C provide less protection to river values from the establishment of minerals and rights-of-way restrictions.

Under these alternatives, the BLM would determine that 45 segments are not suitable. The BLM assumes that removing protective management would result in long-term adverse effects to the ORVs, free-flowing characteristics, and tentative classification identified during the eligibility assessments.

Alternative D

Under Alternative D, the BLM would determine that all 51 eligible segments are suitable for inclusion into the National Wild and Scenic Rivers System. The BLM would continue managing the segments to protect the ORVs, water quality, free-flowing characteristics, and tentative classification. Implementation of Alternative D would result in effects similar to or the same as those described under the No Action alternative as the BLM would not approve any action that would adversely affect the 51 segments' ORVs, water quality, free-flowing characteristics, and tentative classification, and the BLM assumes that these characteristics would persist for at least the life of the plan. This protective management would include requiring mineral leasing stipulations to protect WSR characteristics, recommending to withdraw suitable segment corridors from locatable mineral entry, closing suitable segment corridors to salable mineral development, managing suitable river segments as VRM II, and managing the corridors as ROW avoidance areas.

Table 3-280 shows the Suitable River segments receiving protection from minerals and rights-of-way management restrictions. Compared with Alternatives A, B and C, Alternative D provides the greatest level of protection to river values based on the establishment of minerals and rights-of-way restrictions.

Effects to Non-Suitable Segments from Management for Other Resources

While the BLM would not continue to provide protective management for segments it determines are non-suitable in any given alternative, these non-suitable segments might receive indirect protection for their WSR characteristics (i.e., ORVs, free-flowing nature, water quality, and tentative classification) from management intended to protect other resources. Where protection is not indirect, the BLM assumes that the WSR characteristics associated with the non-suitable segments will degrade over time.

The No Action alternative and Alternative D are not included in this section of the analysis. By continuing existing management, under the No Action alternative, study river corridors would continue to receive protective management under existing eligible determinations. In Alternative D, all study river corridors would be designated suitable; therefore, adequate protections to maintain or enhance relevant and important values within these study river segments are already in place through their designation as suitable.

Effects from Minerals and Lands and Realty Management

Development of leasable and locatable minerals has the potential to affect some ORVs and the tentative classification of non-suitable segments. Similarly, granting of rights-of-way along non-suitable segments could have adverse effects through sedimentation and damage to riparian vegetation, which could result in degradation of water quality. Mineral or right-of-way development along the non-suitable segments could result in a substantially higher level of surface disturbance and visual effects than would be allowed under eligible status.

The lands and realty management action to retain major river corridors and perennial streams would keep all non-suitable segments in BLM ownership; however, retention would not guarantee protection of the free-flowing nature, ORVs, or the tentative classification. **Table 3-281** shows the incidental protection of non-suitable river segments from minerals and rights-of-way restrictions.

Table 3-281. Non-suitable river segments receiving incidental protection from minerals and rights-of-way management.

Alternative	Non-Suitable River Segments (Number)	Stipulation	Right-of-way		Recommended for Withdrawal from Locatable Mineral Entry (Acres)	Closed to Salable Mineral Development (Acres)
		No Surface Occupancy, Controlled Surface Use, Timing Limitation (Acres)	Exclusion (Acres)	Avoidance (Acres)		
Alt. A	51	1,744	1,156	3,226	1,782	2,170
Alt. B	45	747	-	915	516	804
Alt. C	45	1,128	-	2,610	691	892

Where alternatives require leasable mineral stipulations for the protection of other resources along non-suitable river segments these stipulations would provide some level of protection for certain WSR characteristics. Six percent of non-suitable river segments in Alternative A receive incidental protection from mineral stipulations, compared to three percent in Alternative B and five percent in Alternative C.

Non-suitable segments may also receive incidental protection from being within ROW avoidance or exclusion areas designated for the protection of other resources. ROW exclusion would provide the most protection to ORVs and tentative classification by prohibiting all new ROWs in the area. Four percent of non-suitable river segments in Alternative A receive incidental protection from ROW exclusion and eleven percent from ROW avoidance. Four percent of non-suitable segments in Alternative B receive incidental protection from ROW avoidance compared to eleven percent in Alternative C. None of the 23,044 acres of non-suitable river corridors in Alternatives B and C receive incidental protection from ROW exclusion.

Effects from Visual Resource Management

Variations in Visual Resource Management (VRM) classes relative to the location of non-suitable rivers would allow for impacts to the scenic quality and potential loss of a qualifying ORV. Rivers with a scenic ORV would be impacted if visual resources were altered. Visual resources are protected from alteration through VRM Class designations I or II and would maintain the regionally unique scenic quality. VRM Class III and IV would allow decreases to the scenic quality. **Table 3-282** identifies the non-suitable study segments with scenery as a qualifying ORV by alternative.

Table 3-282. Study rivers with scenery as a qualifying outstandingly remarkable value.

Study Rivers with Outstandingly Remarkable Scenic Value	Miles	Corridor Acres	VRM Class I or II			
			No Action (%)	Alt. A (%)	Alt. B (%)	Alt. C (%)
Clackamas River	14.5	4,528	1%	-	-	-
McKenzie River	48.7	15,342	-	-	-	-
Nestucca River	21.1	5,921	-	-	-	-
North Fork Trask River	11.9	3,288	-	-	-	-
North Santiam River	45.9	14,441	2%	-	-	-
Siletz River	66.2	20,040	-	-	-	-
Umpqua River	109.5	34,840	1%	-	-	-
Totals	**317.8**	**98,400**	**4%**	**-**	**-**	**-**

The No Action alternative does not identify a VRM Class specifically for eligible rivers with a scenic ORV; however, 4 percent of study river corridors are currently being managed as VRM Class I or II, which helps to retain the existing visual character. Alterations to the visual landscape that impact the scenic ORV are currently allowed on 96 percent of study rivers. None of the action alternatives would provide protection to the scenic ORVs on any of the seven rivers found non-suitable through VRM Class I or II designations. None of the action alternatives would impact the visual quality of these study rivers since 96 percent of these study river corridors are currently being managed as VRM Class III or IV.

Effects from ACEC Management

Management of relevant and important values within ACECs would generally be complementary to management for study river values. Where ACEC and non-suitable study river boundaries occur simultaneously, ORVs and classification would be less likely to change than when the segment is managed only as a WSR.

The relevant and important values for an ACEC are often identical to ORVs identified for an eligible or suitable river that occurs in the same area. In such cases, overlapping ACEC management for that relevant and important value would also directly maintain or enhance that ORV. Management for overlapping ACECs may also indirectly maintain or enhance a study river's ORVs, even if the ORV is not also a relevant and important value. **Table 3-283** displays acres of non-suitable study rivers with overlapping ACEC designations.

Table 3-283. Non-suitable study river corridors with overlapping Area of Critical Environmental Concern designations (acres).

Study Rivers with ACEC Overlap	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)
Big Butte Creek (including South Fork)	33	33	33
Cow Creek	138	138	138
Fall Creek – Salem	11	11	11
Lake Creek	54	54	54
Little Applegate River	10	10	10
McKenzie River	869	869	869
Middle Santiam River	172	172	172
Nestucca River	1,203	1,203	1,203
North Fork Siletz River	353	-	-
North Santiam River	-	-	-
Riffle Creek	9	9	9
Rogue River	47	-	-
Sandy River	1,516	-	-
Umpqua River	20	20	20
West Fork Illinois River	897	-	-
Willamette River	-	-	-
Total Non-Suitable Acres that Overlap with ACECs	**5,332**	**2,519**	**2,519**

No Action Alternative

By continuing existing management, under the No Action alternative, study river corridors would continue to receive protective management under existing eligible determinations, therefore complementary ACEC designations are not relevant under the No Action alternative because adequate protection maintain or enhance relevant and important values within these study river segments are already in place.

Alternative A

In Alternative A, 14 non-suitable study rivers would have complimentary overlap with ACEC management. The majority of this overlap is a relatively low percentage of each study river's corridor. The highest percentage of overlap occurs on the West Fork Illinois segment (80 percent overlap), Sandy River segment (98 percent overlap) and McKenzie River (95 percent). Management of public lands to maintain or enhance relevant and important values within these ACECs would effectively maintain or enhance study river ORVS and tentative classification on these three segments under Alternative A.

Alternative B and C

In both alternatives B and C, nine non-suitable study rivers would have complimentary overlap with ACEC management. When compared with Alternative A, the overlap is relatively low. The highest percent of overlap occurs on the McKenzie River.

Alternative D

In Alternative D, all study river corridors would receive suitable designations; therefore complementary ACEC designations are not relevant under Alternative D.

Effects from Recreation and Visitor Services Management

Management of recreation outcomes and setting characteristics within Recreation Management Areas (RMAs) would generally be complementary to management for study river values where Recreation was identified as an ORV. In such cases, overlapping recreation management for recreation values would also directly maintain or enhance that ORV regardless of whether or not an eligible river segment was found suitable or not. **Table 3-284** identifies the WSR segments with recreation as a qualifying ORV and the acres that overlap with RMAs by alternative for all non-suitable river segments.

Table 3-284. Non-suitable study river corridors with recreation ORVs with overlapping Recreation Management Area designations (acres).

Non-Suitable WSR Segments with Recreation ORVs Overlapping RMAs	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)
Totals	**519**	**585**	**2,882**

No Action Alternative

The previous definition for Special and Extensive Recreation Management Areas made under the No Action alternative is not comparable to the current RMA definitions. Because of this, the BLM cannot measure the effect from overlapping study river corridor segments with RMA designations under the No Action alternative.

Alternative A

In Alternative A, the fewest acres with recreation ORVs associated with non-suitable river corridors would be incidentally protected by RMAs when compared to the other alternatives.

Alternative B

In Alternative B, a slightly higher acreage with recreation ORVs associated with non-suitable river corridors would be incidentally protected through complimentary RMA designation. Alternative B, provides a greater level of protection for recreation ORVs associated with non-suitable rivers when compared to Alternative A and less protection for recreation ORVs when compared to Alternative D.

Alternative C

In Alternative C, a substantially higher acreage with recreation ORVs associated with non-suitable river corridors would be protected through complimentary RMA designation when compared to Alternatives A and B. Alternative C provides a greatest level of protection for recreation ORVs associated with non-suitable rivers when compared to Alternatives A and B.

Alternative D

In Alternative D, all eligible Wild and Scenic Rivers would be found suitable for inclusion into the National Wild and Scenic River System. All eligible rivers with recreation ORVs would receive adequate protections through suitable determinations regardless of where study rivers with recreation ORVs overlap with RMA designations.

Effects from Riparian Management

Fish have been identified an ORV on 79 percent of BLM-administered acres within the eligible river corridors. Fish have been identified as the sole ORV on 47 percent of BLM-administered lands within the eligible river corridors.

Under all alternatives, there will be no impact to fish-related ORVs for any of the 51 currently eligible segments, regardless of whether they are determined to be suitable in any particular alternative. As stated in the fisheries and hydrology sections of the EIS (the Fisheries and Hydrology sections contain more information) the riparian management strategies would all have similar consequences in that they would be protective of stream shade and will not increase stream temperatures for any of the alternatives. Absent any affect to stream temperature, there will be no affect to fish ORVs resulting from any of the alternatives.

Effects from Forest Management

For those rivers found non-suitable, ORVs would be negatively impacted where non-suitable river corridors overlap with the Harvest Land Base. Forest management would impact the river corridors and associated ORVs of scenery, wildlife, botany, ecology, and recreation. **Table 3-285** displays acres of non-suitable study river corridors that overlap with the timber Harvest Land Base.

Table 3-285. Non-suitable river corridors with overlapping timber Harvest Land Base.

Alternative	Number of Non-Suitable River Segments	Harvest Land Base (Acres)	Total BLM-Administered Acres in River Corridor
Alt. A	51	2,469	29,378
Alt. B	45	3,882	22,236
Alt. C	45	5,442	22,236

No Action Alternative

In the No Action alternative, all 51 eligible rivers would continue to receive interim protection through their current eligible designations.

Alternative A

Alternative A would have 8 percent of non-suitable river corridors within the Harvest Land Base. Alternative A has a fewest acres of non-suitable river corridor within the Harvest Land Base when compared to Alternatives B and C. When compared to the other action alternatives, the effects from forest management activities on non-suitable corridors will be the least under Alternative A.

Alternative B

Alternative B has 17 percent of non-suitable river corridors within the Harvest Land Base. Alternative B has a larger number of acres of non-suitable river corridor within the Harvest Land Base when compared to Alternative A and fewer acres than Alternative C.

Alternative C

Alternative C has 24 percent of non-suitable river corridors within the Harvest Land Base. Alternative C has the largest number of non-suitable river acres within the Harvest Land Base when compared to all Alternatives.

Alternative D

In Alternative D, forest management activities would not affect the river values and associated ORVs of scenery, wildlife, botany, ecology, and recreation because all eligible rivers would be found suitable for inclusion into the National Wild and Scenic River system, receiving long-term river protection.

Effects from Comprehensive Trail and Transportation Management

OHV use could affect ORVs and classifications of non-suitable river segments. Eligible Wild and Scenic River segments are better protected from sedimentation and erosion by shifting from an *open* to a *limited to existing* or *limited* area designation. Closing areas to OHV travel, or restricting OHV use to existing or designated routes, would reduce effects in the corridors of the study segments. Damage to vegetation and sedimentation would be reduced or eliminated, which would protect water quality that supports ORVs, specifically history, ecology, scenic, wildlife, and botany. **Table 3-286** displays non-suitable river corridor acres that overlap with the Harvest Land Base for each alternative.

Table 3-286. OHV area designations for eligible river corridors.

OHV Area Designations Within Segments	No Action (Acres)	Alt. A (Acres)	Alt. B (Acres)	Alt. C (Acres)	Alt. D (Acres)
Closed	790	327	1,760	3,243	3,470
Limited to Designated	20,763	110	218	1,501	537
Limited to Existing	-	28,942	27,401	24,635	25,371
Open	6,066	-	-	-	-
Totals	**27,619**	**29,379**	**29,379**	**29,379**	**29,379**

No Action Alternative

In the No Action alternative, 6,066 acres would be open to cross-country OHV use. When compared to the action alternatives, the No Action alternative has the greatest number of acres open to cross-country OHV use. Cross-country OHV use affects ORVs and classifications of study river segments. The rugged terrain and topography that characterizes some of the study rivers has presented a barrier to OHV intrusions in the past and would likely continue to do so in the future, although increased recreation demand and evolving motorized and mechanized equipment technology could allow vehicles to enter and affect areas OHVs have not been able to access in the past.

Alternative A

In Alternative A, the majority of acres within non-suitable river corridors are designated as limited to existing. Under Alternative A there are no acres designated as *open* to OHV use.

By shifting to *limited to existing* and *limited to designated routes* from an *open* designation, the non-suitable river corridors would be better protected from sedimentation and erosion in Alternative A when compared to the No Action alternative, and less protective when compared to Alternatives B and C.

Alternative B

In Alternative B, effects are similar to those in Alternative A when comparing the number of acres designated as limited to existing OHV use. Under Alternative B, approximately 6 percent of the non-suitable river corridors would be designated closed to OHV use. Alternative B has a higher percentage of closed area designations when compared to Alternative A and a smaller percentage of closed area designations compared to Alternatives C and D.

Alternative C

In Alternative C, effects are similar to those described in Alternative A and B when comparing the number of acres and corresponding percentage of the study river corridors designated as limited to existing OHV use. Under Alternative C approximately 11 percent of the study river corridors are closed to OHV use. Alternative C has a higher percentage of study river corridors closed to OHV use when compared to the No Action alternative and Alternatives A and B. Alternative C has a smaller percentage of study river corridors closed to OHV use when compared to Alternative D.

Alternative D

In Alternative D, effects are similar to those described in Alternative A, B, and C when comparing the number of acres and corresponding percentage of the study river corridors designated as limited to existing OHV use. Under Alternative D, approximately 12 percent of the study river corridors are closed to OHV use. Alternative D has the highest percentage of study river corridors closed to OHV use when compared to all alternatives.

References

USDI BLM. 2014. BLM Manual 6400 – Wild and Scenic Rivers – Policy and Program Direction for Identification, Evaluation, Planning, and Management. Washington D.C. http://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.76771.File.dat/6400.pdf

Chapter 4 – Consultation and Coordination

Introduction

This chapter describes the public involvement and collaboration that occurred during the preparation of this Draft RMP/EIS. That collaboration includes government-to-government relationships with Tribes, formal cooperators in the planning process, and consultation with Federal and State agencies. This chapter also includes a list of staff involved in the RMPs for Western Oregon.

Public Involvement

Formal scoping for the RMPs started with printing of the Notice of Intent in the Federal Register on March 9, 2012 (77 FR 14414). The BLM initially requested that the public submit comments in response to the Notice of Intent by July 5, 2012. The BLM continued to accept any public comments for an additional 90 days. By October 5, 2012, the BLM had received 584 comment letters. During the scoping period, the BLM held public meetings in Medford, Grants Pass, Klamath Falls, Salem, Springfield, Coos Bay, Roseburg, and Portland.[113] At each of these meetings, the BLM provided a brief overview of the planning process and a list of questions to prompt feedback, and then opened the meeting for discussion. The BLM prepared a scoping report, which contains a summary of this scoping process. The scoping report and other scoping documents are available at http://www.blm.gov/or/plans/rmpswesternoregon/scoping.php.

During the winter of 2013, the BLM initiated a multi-phase outreach strategy to engage the public specifically on recreation management issues. The BLM sought to gain a better understanding of the social values associated with recreational users across western Oregon. This strategy included an interactive website and four regional workshops in Medford, Roseburg, Springfield, and Portland. The regional workshops included the participation of the National Park Service-Rivers, Trails and Conservation Assistance program, the Association of O&C Counties, the Outdoor Alliance, Travel Oregon, the Cow Creek Band of the Umpqua Tribe of Indians, and the Mazamas. The BLM designed this recreation outreach to answer planning questions, collect quantitative and qualitative data specific to recreation management area delineation, and to understand better the role, value, and importance that recreation plays within each planning region. Outreach also yielded data related to public demand for specific types of recreation activities, experiences, beneficial outcomes, and the desired character of BLM-administered recreation settings. **Appendix N** - Recreation key findings report contains a summary of the results of this outreach effort.

[113] The BLM has listed the cities in this chapter in order by meeting date.

In June of 2013, the BLM released the Purpose and Need Statement for the RMPs for Western Oregon. While this is not a typical step in the planning process, the BLM shared the Purpose and Need Statement earlier than usual in order to augment dialogue on the direction of the planning process. The Purpose and Need Statement is available at http://www.blm.gov/or/plans/rmpswesternoregon/files/purpose.pdf.

In August of 2013, the BLM released the Analysis of the Management Situation for the RMPs for Western Oregon (USDI BLM 2013). The BLM managers use the Analysis of the Management Situation as a snapshot to understand the status of the BLM resources and management opportunities in western Oregon, and the BLM shared this document for informational purposes. The Analysis of the Management Situation is available at http://www.blm.gov/or/plans/rmpswesternoregon/files/ams-rmps-western-oregon.pdf.

During December of 2013, the BLM conducted four community listening sessions on elements of the RMP. The BLM held public meetings in Corvallis, Medford, Coos Bay, and Roseburg. The community listening sessions included BLM updates on the planning process and attendees had a chance to share their input with the BLM and each other through small group discussions. A report (USDI BLM 2014a) on the community listening sessions is available at http://www.blm.gov/or/plans/rmpswesternoregon/files/comm-listen-report.pdf.

On February 24, 2014, the BLM released the Planning Criteria (USDI BLM 2014b), which provided an in-depth look at guidance, policy, analytical methodology, and preliminary alternatives. The comment period for the Planning Criteria continued until March 31, 2014. The BLM received approximately 3,000 letters during this comment period. During March 2014, the BLM conducted seven public meetings about the Planning Criteria and the preliminary alternatives. The BLM held public meetings in Portland, Springfield, Salem, Roseburg, Coos Bay, Medford, and Klamath Falls. The BLM also held an additional public meeting in Roseburg with invited elected officials. The Planning Criteria is available at http://www.blm.gov/or/plans/rmpswesternoregon/files/rmp-criteria.pdf.

Additionally, the BLM has provided information to the public through various digital media outlets, including the BLM's public website, Twitter, and Facebook. The public can send inquiries to the agency at any time through a publicly available email address, BLM_OR_RMPs_WesternOregon@blm.gov.

The BLM is planning a series of public meetings after the release of the Draft RMP/EIS. The purpose of these meetings is to help members of the public understand the content of the Draft RMP/EIS and provide meaningful and constructive comments. There will likely be six "open-house" public meetings (one meeting per District) where people can engage with BLM employees on all resources addressed in the Draft RMP/EIS. The BLM will likely also be organizing issue-specific meetings on topics such as socio-economics, forestry, aquatics, and wildlife. Information on meeting locations and dates and more information about agency outreach is available at http://www.blm.gov/or/plans/rmpswesternoregon/public.php.

List of Recipients of the Draft RMP/EIS

The BLM will distribute the Draft RMP/EIS to a mailing list of those agencies, organizations, Tribes, and individuals that have requested copies. This mailing list, which includes approximately 1,700 hard copy mailings and 1,800 electronic copy mailings, is incorporated here by reference (USDI BLM, 2014).

Government-to-Government Relationships

Federally recognized tribes have a unique relationship with the Federal Government in that they are sovereign nations and retain inherent powers of self-government. They interact with the United States on a government-to-government level.

When preparing RMPs, the BLM consults with Tribes to provide Tribes with an opportunity to identify any issues or concerns that Tribes may have with the management of lands and resources in the decision area; to identify places of religious or cultural significance (and if any issues exist with access to places needed for the practice of traditional religions); and whether there are other Indian individual or traditional cultural leaders who the BLM should also contact.

There are nine federally recognized Tribes located within, or that have interests within, the planning area:

- The Confederated Tribes of Grand Ronde: www.grandronde.org
- The Confederated Tribes of Siletz Indians: www.ctsi.nsn.us
- The Coquille Indian Tribe: www.coquilletribe.org
- The Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians: www.ctclusi.org
- The Confederated Tribes of Warm Springs: www.warmsprings.com
- The Cow Creek Band of Umpqua Tribe of Indians: www.cowcreek.com
- The Klamath Tribes: www.klamathtribes.org
- The Quartz Valley Indian Reservation: www.qvir.com
- The Karuk Tribe: www.karuk.us

The BLM invited all of the above Federally-recognized Tribes to be formal cooperators in the RMP revisions because of their special expertise, as described below. The Confederated Tribes of Grand Ronde, the Confederated Tribes of Siletz Indians, the Coquille Indian Tribe, the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians, the Cow Creek Band of Umpqua Tribe of Indians, and the Klamath Tribes are formal cooperators in the RMP revisions, in addition to their government-to-government status.

In 2013, the BLM offered all Tribes within the planning area an opportunity to schedule individual Tribal listening sessions. The BLM met with five tribes on different dates spanning from May 14, 2013, to December 13, 2013.

In addition to their government-to-government relationship and their role as a formal cooperator, the Coquille Indian Tribe has a representative on the Westside Steering Committee, as noted below. The BLM has also agreed to meet regularly with the Coquille Indian Tribe to facilitate open and recurring communication. The Coquille Indian Tribe is directly engaged in the planning process, because the management of the Coquille Forest is subject by law (25 U.S.C. 715c(d)) to the standards and guidelines of forest plans for adjacent or nearby Federal forest lands. Title V of the Oregon Resource Conservation Act of 1996 (Public Law 104-208) included the creation of the Coquille Forest to be held in trust for the benefit of the Coquille Indian Tribe. The Act states that the Coquille Forest shall be managed “under applicable State and Federal forestry and environmental protection laws, and subject to critical habitat designations under the Endangered Species Act, and subject to the standards and guidelines of Federal forest plans on adjacent or nearby Federal lands, now and in the future." This Act also requires the Secretary of the Interior, through the Bureau of Indian Affairs, to take the Coquille Forest lands into trust for the benefit of the Coquille Indian Tribe. For the purposes of interpreting Title V of this Act, the management direction that will be described within the eventual RMP is synonymous with the "standards and guidelines" referenced in this Act.

Formal Cooperators

The FLPMA and NEPA provide direction regarding the coordination and cooperation of Federal agencies with other agencies and local and state governments and tribes. The FLPMA specifically emphasizes the need to ensure coordination and consistency of the BLM's proposed actions with the plans and policies of other relevant jurisdictions. The Council on Environmental Quality's regulations for implementing NEPA specifically requires cooperative relationships between lead and cooperating agencies.

Cooperating agency status provides a formal framework for governmental units (including local, State, Federal, and tribal) to engage in active collaboration with a lead Federal agency to implement requirements of the National Environmental Policy Act. For these RMP revisions, the BLM has worked with cooperators from many agencies. With all formal cooperators, the BLM has signed a memorandum of understanding, identifying the roles and responsibilities of the BLM and the cooperating agency in the planning process. **Table 4-1** contains a list of the formal cooperators for these RMP revisions.

Table 4-1. Formal cooperators.

Government Type	Cooperator
County Governments[114]	Benton County
	Clackamas County
	Columbia County
	Coos County
	Curry County
	Douglas County
	Klamath County
	Lane County
	Lincoln County
	Linn County
	Marion County
	Multnomah County
	Polk County
	Tillamook County
	Washington County

[114] With the exception of Benton County, all of the listed counties have authorized the Association of O&C Counties to act as the counties' agent and representative in their role as cooperating agencies in this planning process. Occasionally, some counties represented by the Association of O&C Counties have had a county commissioner participate in the activities of the planning process. When that has happened, the county commissioner, rather than the Association of O&C Counties, has represented the county.

Government Type	Cooperator
	Yamhill County
State Government	State of Oregon[115]
Federal Government	Environmental Protection Agency
	National Marine Fisheries Service
	U.S. Fish and Wildlife Service
	U.S. Forest Service
Tribes	Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians
	Confederated Tribes of Grand Ronde
	Confederated Tribes of Siletz Indians
	Coquille Indian Tribe
	Cow Creek Band of Umpqua Tribe of Indians
	Klamath Tribes

Working through a robust engagement process with neutral facilitation, the cooperators have provided expertise on much of the subject matter the BLM is addressing in the Draft RMP/EIS, as well as advice based on experience with similar planning efforts. The cooperators have provided feedback on public outreach sessions, data sources and analytical methods, and components of the draft alternatives. They have provided oral and written feedback and ideas throughout the process of developing the Draft RMP/EIS. DS Consulting, working through Oregon Consensus, has facilitated all meetings of the full Cooperating Agency Advisory Group and the five individual working groups.

The full Cooperating Agency Advisory Group first met in the summer of 2012, when the facilitators led them through an orientation to the cooperating agency task and assisted the group in defining its desired outcomes. In the fall and winter of 2012, the Cooperating Agency Advisory Group met five times to provide and review RMP scoping comments and to discuss the RMP process. They also met three times to provide comments and review documents developed by the BLM for the planning effort, including the purpose and need for action and the planning criteria, in addition to providing written comments on the BLM's methodology for analyzing the effects of the alternatives. The Cooperating Agency Advisory Group met once to provide feedback on the public meetings held in 2013 and 2014. The BLM conducted a rehearsal of the public meetings with the Cooperating Agency Advisory Group, which provided feedback on the content and format, leading the BLM to make improvements to the outreach sessions. The Cooperating Agency Advisory Group also met five times to discuss the results of the analysis and to provide feedback to the BLM on the identification of a preferred alternative.

In addition to meeting as a full group periodically throughout the development of the Draft RMP/EIS, the Cooperating Agency Advisory Group also created five working groups in the winter of 2013 in order to facilitate a more detailed level of engagement with the BLM. These groups focused, respectively, on the following topics: aquatics, outreach, terrestrial, socio-economics, and tribal issues.

The Aquatics Working Group met six times during the development of the Draft RMP/EIS. The BLM updated the group on the status of alternative development. The working group provided comments on the

[115] Department of Environmental Quality, Department of Fish and Wildlife, and Department of Forestry are the Oregon State agencies actively engaged in the planning process.

development of the riparian management strategies and the methodology for analyzing impacts of the alternatives on aquatic habitat and water quality.

The Outreach Working Group met six times during the development of the Draft RMP/EIS. The group discussed outreach planning and goals and provided input on the outreach timeline. During the winter of 2013, they met to revisit ideas for outreach during the planning criteria comment period.

The Terrestrial Working Group met five times during the development of the Draft RMP/EIS. The BLM updated this group on the development of the terrestrial components of the RMP (e.g., alternative approaches for the large block reserve design). The group reviewed and provided input on the methodology for analyzing the impacts of the alternatives on terrestrial resources and met to discuss and provide feedback on components of the draft alternatives related to timber harvest, northern spotted owl conservation, marbled murrelet conservation, and fire and fuels management.

The Socio-Economic Working Group met eight times during the development of the Draft RMP/EIS. This group reviewed and refined the methodology for analyzing the socio-economic analysis of the alternatives, including working with BLM and its contractors on the development of a method to analyze impacts to community capacity and resiliency. Members of this group assisted the BLM in obtaining county economic data and identifying city officials for information-collection interviews.

The Tribal Working Group met six times during the development of the Draft RMP/EIS. This group provided input on the process by which the BLM conducted tribal listening sessions and consultation. They also provided input on aspects of the draft alternatives and analytical methodology that address resources of concern to the tribes represented in the group. Members of the group also reviewed and provided content for appendices to the Tribal Interests section of the Draft RMP/EIS.

Additionally, the Coquille Indian Tribe, in their capacity as a cooperating agency, suggested to the BLM a riparian strategy. The BLM worked with the Coquille Indian Tribe to develop this suggestion in detail and include it among the alternatives in the Draft RMP/EIS, in addition to the riparian strategies developed by the Riparian Technical Team described below.

The BLM district managers and planning personnel have met with individual county commissioners on an ongoing basis to provide updates on progress and key milestones. As noted above, several county governments are formal cooperators in the planning process. While the Association of O&C Counties represents most of the counties at the Cooperating Agency Advisory Group meetings, BLM district managers also maintain relationships with local county representatives.

Documenting Disagreement or Inconsistencies with Cooperating Agencies[116]

The Cooperating Agency Advisory Group and its sub-groups have provided the BLM with a unique opportunity to share the BLM's thinking early in the planning process and for the BLM to hear the ideas and concerns cooperating agencies have with how the BLM has been planning and analyzing thus far. At this point in the process, all cooperators have had numerous opportunities to express their opinions about content and process, and to make suggestions about how the BLM might improve its plan. By and large,

[116] This summary documenting disagreement or inconsistencies with cooperating agencies was provided to the BLM by the outside, impartial facilitation team from Oregon Consensus after reviewing meeting summaries and letters from the Cooperating Agency Advisory Group.

most disagreements that have arisen have been resolved through dialogue at meetings of the full group and its work groups. Nearly all cooperators have been positive about the level of engagement and the general direction of the planning process. However, the Association of O&C Counties (which is the designated representative of 15 counties) has continued to express a high level of concern about the BLM's planning process.

Specifically, the Association of O&C Counties continues to assert that the BLM's Purpose and Need statement was fatally flawed by failing to place sustained yield timber production as the primary purpose of the planning effort. In letters to the BLM Director, State Director and Project Manager, and at nearly all Cooperating Agency meetings, the Association of O&C Counties representatives have maintained that the BLM should have placed sustained yield timber as the primary focus of the planning effort with all other actions required by other laws and treaties falling secondary to that purpose. As a result, the Association of O&C Counties has expressed disagreement with the purpose and need, the planning criteria, and the range of alternatives. The Association of O&C Counties maintains that the O&C Act and legal opinions that have stemmed from it mandate that the BLM should first provide a minimum of 500 million board feet of sustained yield timber harvest per year, then balance all other needs after that has been provided. The Association of O&C Counties and its member counties have stated that, because the BLM has sought to analyze what a balanced approach between the competing laws, treaties and needs of all cooperating agencies might look like, the BLM has created a range of alternatives that is too narrow to achieve the primary purpose and the level of sustained yield required by law and court decisions.

That said, the Association of O&C Counties continues to attend and actively participate in the Cooperating Agency Advisory Group and its work groups, making certain that all members are aware of this fundamental disagreement—and requesting that the BLM broaden the range of alternatives by including the alternative developed in the 2008 Western Oregon Plan Revision.

Consultation

Endangered Species Act

Before signing a Record of Decision on the RMP revisions, the BLM will consult with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service under Section 7(a)(2) of the Endangered Species Act (ESA). The BLM, U.S. Fish and Wildlife Service, and National Marine Fisheries Service signed an ESA Consultation Agreement, which identifies responsibilities for each agency and defines the processes, products, actions, timeframe, and expectations for the consultation process. The ESA Consultation Agreement, signed June 18, 2013, is available at http://www.blm.gov/or/plans/rmpswesternoregon/files/esa-consult-agree.pdf.

As part of this consultation, the BLM will prepare biological assessments of the potential effects of implementing the proposed RMP. In these biological assessments, the BLM will describe the proposed RMP, the geographic area addressed by the RMP, and the manner in which the RMP would affect threatened, endangered, and proposed species and their designated and proposed critical habitats.

As part of this consultation, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service will provide their biological opinions. These biological opinions will include assessments of the status of the species and critical habitats involved, contain reviews of the potential effects of the RMP on these species and habitats, and provide evaluations of whether the RMP would be likely to jeopardize the continued existence of any species or destroy or adversely modify their critical habitats. The U.S. Fish and Wildlife Service and National Marine Fisheries Service will prepare separate biological opinions dealing with terrestrial and aquatic species under their respective ESA jurisdiction. Additional information on the biological assessments and biological opinions is available in the ESA Consultation Agreement.

In addition to their role as formal cooperators, the U.S. Fish and Wildlife Service and National Marine Fisheries Service have met with the BLM repeatedly throughout the planning in preparation for the ESA consultation on the RMPs for Western Oregon. As part of that work and consistent with the ESA Consultation Agreement, the BLM and U.S. Fish and Wildlife Service have met as a Terrestrial Technical Team in April 2013, September 2013, January 2014, February 2014, and March 2014 to discuss the analytical methodology for evaluating the effects of the alternatives on listed species and producing analytical information for the biological assessments. The BLM also met directly with the U.S. Fish and Wildlife Service in April 2014 to discuss specifically the forest management approach for northern spotted owl critical habitat in Alternative D considered in the Draft RMP/EIS.

The BLM convened a group including representatives of the National Marine Fisheries Service and Environment Protection Agency in April and May 2013 to develop a strategic proposal for riparian management. The Environmental Protection Agency has participated in these meetings in the capacity of their technical expertise related to water quality. The BLM, National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Environmental Protection Agency met as a Riparian Technical Team to develop that strategic proposal in detail to be included among the alternatives in the Draft RMP/EIS. DS Consulting facilitated all meetings of the Riparian Technical Team. The Riparian Technical Team met seven times from August 2013 to January 2014 and presented their work to the Cooperating Agency Advisory Group on January 30, 2014.

In addition, the BLM has met directly with the National Marine Fisheries Service in March 2014, April 2014, and June 2014 to discuss analytical methodology for evaluating the effects of the alternatives on listed fish species and producing analytical information for the biological assessment. The BLM met again in December 2014 with the National Marine Fisheries Service, Environmental Protection Agency, and U.S. Fish and Wildlife Service to continue discussions on the biological needs of listed fish species.

Water and Air Quality Management

As part of these RMP revisions, the BLM will concurrently coordinate with various agencies on water and air quality management. The BLM will coordinate with the Environmental Protection Agency and the Oregon Department of Environmental Quality (the federally designated management agency) on water quality standards and other requirements of the federally designated management agency as authorized by the Clean Water Act. Similarly, the BLM will coordinate with the Environmental Protection Agency, Oregon Department of Environmental Quality, and U.S. Forest Service when authorizing implementation actions to minimize the impacts of the emissions from prescribed burns.

List of Preparers

Westside Steering Committee

The Westside Steering Committee is comprised of BLM Oregon/Washington Deputy State Director - Division of Resources, the six BLM district managers represented in the RMP revisions, and a representative from the Coquille Indian Tribe. This committee provides leadership and direction to the RMP revisions planning process.

Key Project Staff

An interdisciplinary team of resource specialists and managers from the BLM districts and state office, and contract personnel prepared the Draft RMP/EIS for the RMPs for Western Oregon. The following table lists the staff, the organization where each staff member works, and their area of responsibility. Brief biographies for each BLM interdisciplinary team member are included below in **Table 4-2**.

Table 4-2. List of key project staff.

Name	BLM Office	Area of Responsibility
Michael Allen	Oregon State Office	Management and Program Analyst
Stewart Allen	Oregon State Office	Socioeconomics
Peter Broussard	Coos Bay District	Sustainable Energy
Mark Brown	Oregon State Office	Project Manager
Dan Carpenter	Coos Bay District	Hydrology
Susan Carter	Roseburg District	Rare Plants and Fungi
J. Byron Clayton	Oregon State Office	Lands and Realty
Lori Crumley	Lakeview District	Grazing and Wild Horses
Craig Ducey	Oregon State Office	Inventory Data Support
Louisa Evers	Oregon State Office	Air Quality and Climate Change
Paul Fyfield	Oregon State Office	Cartography
Eric Greenquist	Oregon State Office	Wildlife – Northern Spotted Owl
Richard Hardt	Oregon State Office	Interdisciplinary Team Leader
Claire Hibler	Salem District	Invasive Species and Areas of Critical Environmental Concern
Eric Hiebenthal	Oregon State Office	GIS Data Management
Aimee Hoefs	Coos Bay District	Writer, Editor, and Records
Carolina Hooper	Oregon State Office	Vegetation Modeling
Zach Jarrett	Salem District	Recreation, Visual Resource Management, and the National Landscape Conservation System
Craig Kintop	Roseburg District	Forest Management
Sarah Levy	Oregon State Office	Public Affairs Officer
Rex McGraw	Roseburg District	Wildlife – All but the Northern Spotted Owl
Arthur Miller	Oregon State Office	GIS and Data Analysis
Diane Parry	Medford District	Minerals
Heather Partipilo	Coos Bay District	Assistant Editor
Lauren Pidot	Oregon State Office	Associate Interdisciplinary Team Leader
Cory Sipher	Roseburg District	Fisheries
Dale Stewart	Oregon State Office	Soils
Brian Thauland	Oregon State Office	Roads
Shelli Timmons	Oregon State Office	Management Analyst
Heather Ulrich	Eugene & Salem Districts	Cultural Resources and Tribal Interests
Jena Volpe	Medford District	Fire and Fuels
Abe Wheeler	Roseburg District	Forest Management

Mike Allen – Management and Program Analyst. Mike earned a Bachelor of Science in Wildlife Management at Humboldt State University. Mike started his 37-year career with the BLM as a wildland firefighter on the Lakeview District. That led to wildlife biologist positions in Lakeview and Prineville.

He worked 16 years on the Salem District as a Natural Resource Specialist performing wildlife surveys, timber sale preparation, and public outreach. Mike has been a Management and Program Analyst at the Oregon State Office for 3 years.

Stewart Allen – Socioeconomics. Stewart earned a Bachelor of Arts in mass communications and a Bachelor of Arts in psychology at the University of Utah, a Master of Arts in social/environmental psychology at Claremont Graduate School, and a Ph.D. in forestry (with a minor in psychology) at the University of Montana. He has 34 years of experience in the human dimensions of natural resources including 20 years with the Federal Government and one and a half years with the BLM as Socioeconomic Specialist, a zoned position shared by Oregon/Washington, California, and Alaska.

Peter Broussard – Sustainable Energy. Pete earned a Bachelor of Science in mechanical engineering at the University of Southwestern Louisiana. Registered as a professional engineer for 36 years, he currently holds professional engineering licenses in three states. Most of his private-sector career has been in the electric utility, gas pipeline, and petroleum industries. His public service includes eight years in the military as a combat engineer, and five years with the BLM as the Engineering Supervisor in the Coos Bay District.

Mark Brown – Project Manager. Mark Brown currently serves as the RMPs for Western Oregon Project Manager in the BLM Oregon State Office. He previously served as the BLM Partnership Coordinator. His federal career began as a Presidential Management Fellow with the National Park Service and U.S. Forest Service before joining the BLM in 2002. He earned a Master of Environmental Management from Yale University, School of Forestry and Environmental Studies, and a Master of Public Administration at Portland State University, Hatfield School of Government.

Dan Carpenter – Hydrology. Dan earned a Bachelor of Science in soil conservation from Washington State University. He has worked as a professional hydrologist for the past 35 years with the U.S. Forest Service and the BLM on the Oregon Coast, Western Cascades, and Great Basin in Nevada. He is currently the District Hydrologist in the Coos Bay District.

Susan Carter – Rare Plants and Fungi. Susan earned a Bachelor of Arts in botany and environmental biology (double major) from Humboldt State University and has 25 years of experience working as a botanist with the BLM and the U.S. Forest Service. She is currently the District Botanist in the Roseburg District.

J. Byron Clayton – Lands and Realty. Byron earned a Bachelor of Arts in geography at Appalachian State University and a Master of Science in geography at Portland State University. He began work for the BLM in 2001 as a student cartographer with the Land Records Team in the Branch of Lands and Minerals. He is currently the Supervisory Geographer of the Land Records Team in the Branch of Geographic Sciences in the BLM Oregon State Office.

Lori Crumley – Grazing and Wild Horses. Lori earned a Bachelor of Science in range ecology and a Master of Science in plant science at the University of Idaho. She has seven years of experience working for the Federal Government as a Range Management Specialist. For the last three years, she has been a Range Management Specialist for the Lakeview Field Office in the Lakeview District.

Craig Ducey – Inventory Data Support. Craig earned a Bachelor of Science in botany at the University of Wyoming and a Master of Science in geography at Portland State University. He has 14 years of experience as a GIS/Remote Sensing Specialist in the BLM Oregon State Office.

Louisa Evers – Air Quality and Climate Change. Louisa earned a Bachelor of Science in forestry from the University of Tennessee, a Master of Science in forestry with an emphasis in fire ecology from the University of Idaho, and a Ph.D. in environmental science with an emphasis in rangeland ecology from Oregon State University. She has 28 years of experience with BLM and the U.S. Forest Service in fuels and fire management, fire ecology, vegetation ecology, and climate change. She is currently the Research Liaison and Climate Change Coordinator in the BLM Oregon State Office.

Paul Fyfield – Cartography. Paul earned a Bachelor of Arts and a Master of Science in geography at Portland State University. He has worked for the BLM Oregon State Office in Portland since 2001. He is currently a Cartographer with the BLM Oregon State Office.

Eric Greenquist – Wildlife – Northern Spotted Owl. Eric earned a Bachelor of Arts in biology at the University of Missouri and a Master of Science in wildlife ecology at Ohio University. He has worked as a professional wildlife biologist for 37 years, including 34 years with the BLM with the past 22 years in western Oregon. He is the District Wildlife Biologist in the Eugene District, where he leads the wildlife and endangered species management programs.

Richard Hardt – Interdisciplinary Team Leader. Richard earned a Bachelor of Arts in natural sciences at Johns Hopkins University, a Master of Landscape Architecture at Harvard University, and a Ph.D. in Forest Resources at the University of Georgia. He has 20 years of experience working for the BLM and is currently a planner in the BLM Oregon State Office.

Claire Hibler – Invasive Species and Areas of Critical Environmental Concern. Claire earned a Bachelor of Science in forest management at Oregon State University and a Bachelor of Arts in general biology at Humboldt State University. Claire is a founding member of, and participates on, the steering committee for the Western Invasives Network, which spans northwest Oregon, part of southwest Washington, and the Columbia River Gorge. She has worked in the Salem District for more than 25 years, serving as the District Botanist since 2001.

Eric Hiebenthal – GIS Data Management. Eric earned a Bachelor of Science in geography at Oregon State University. He has 18 years of experience with the BLM working with GIS, specializing in GIS Data Management. He is currently a GIS Data Management Specialist in the BLM Oregon State Office.

Aimee Hoefs – Writer, Editor, and Records. Aimee earned a Bachelor of Arts in molecular biology at Colgate University. She has worked for the BLM for nineteen years and has been a NEPA specialist for the past seven years. She is currently the Myrtlewood Field Office Planning and Environmental Coordinator in the Coos Bay District.

Carolina Hooper – Vegetation Modeling Lead. Carolina earned a Bachelor of Science in forestry at Humboldt State University and a Master of Science in forestry at Oregon State University. She has worked in forest inventory and planning for the last 20 years with the U.S. Forest Service and the BLM. She is currently a Forester/Resource Information Analyst in the BLM Oregon State Office.

Zach Jarrett – Recreation, Visual Resource Management, and the National Landscape Conservation System. Zach earned a Bachelor of Science in recreation resource management at Oregon State University and a Master of Science in natural resource planning at Humboldt State University. He has 13 years of experience working for the BLM in western Oregon and is currently an outdoor recreation planner in the Oregon State Office working on regional recreation and travel planning projects.

Craig Kintop – Forest Management. Craig earned a Bachelor of Science in forest resources management at the University of Minnesota. He has more than 38 years of experience working for the U.S. Forest Service and the BLM and is currently the District Forester/Silviculturist in the Roseburg District.

Sarah Levy – Public Affairs Officer. Sarah earned a Bachelor of Arts at the University of Southern California, and a Master of Science in natural resources and environment at the University of Michigan, School of Natural Resources and Environment. Sarah has six years of experience with the U.S. Forest Service working in public affairs, recreation, and research and is currently a Public Affairs Officer with the BLM Oregon State Office.

Rex McGraw – Wildlife. Rex earned a Bachelor of Science and a Master of Science in wildlife biology at the University of Montana, Missoula. He has 16 years of experience with the BLM and is currently the District Wildlife Biologist in the Roseburg District.

Arthur Miller – GIS and Data Analysis Lead. Arthur earned Bachelor of Science and Bachelor of Arts in geography at Oregon State University. He has over 25 years of experience working with the BLM in Oregon, with an emphasis on the use of geographic information systems for resource and land use planning. He is currently a Geographic Information Specialist with the BLM Oregon State Office.

Diane Parry – Minerals. Diane earned a Bachelor of Arts in geology at Humboldt State University. She has 28 years of experience as a geologist with the BLM and is currently the Lead Geologist in the Medford District, zoned to the westside of Oregon.

Heather Partipilo – Assistant Editor. Heather earned her Bachelors of Science degree in Botany and a Master of Science degree in Botany and Plant Pathology from Oregon State University. She has worked on the Lakeview District as a botanist and is currently a Planning and Environmental Coordinator for the Umpqua Field Office of the Coos Bay District.

Lauren Pidot – Associate Interdisciplinary Team Leader. Lauren earned a Bachelor of Arts in government at Wesleyan University and a Master of Science in natural resource policy at the University of Michigan. She has over six years of experience with the BLM and is currently a planner for the BLM Oregon State Office.

Cory Sipher – Fisheries. Cory earned a Bachelor of Science in biology at the State University of New York at Cortland and a Master of Science in fishery biology at Colorado State University. Cory has been with the BLM for 12 years, starting his career as a fisheries biologist in the South River Field Office of the Roseburg District. He has served as the District Fisheries Biologist in the Roseburg District since 2012.

Dale Stewart – Soils. Dale earned a Bachelor of Science in forestry and a Master of Science in biological sciences at Michigan Technological University. He has over 35 years of experience working in the forestry, soil, and hydrology disciplines with the BLM and U.S. Forest Service in Oregon. He is currently the Soil, Water, and Air Program Lead in the BLM Oregon State Office.

Brian Thauland – Roads. Brian earned a Bachelor of Science in forest management at Iowa State University. He has 36 years of experience with the BLM in forest engineering and currently provides transportation program support at the BLM Oregon State Office.

Shelli Timmons – Management Analyst. Shelli earned a Bachelor of Arts in Business Communication at the University of Phoenix. Shelli has over 15 years of experience in the administration and management fields, the last 4 of which have been in the BLM Oregon State Office.

Heather Ulrich – Cultural Resources and Tribal Interests. Heather earned a Bachelor of Arts and Master of Science in anthropology at the University of Oregon. She has been with the BLM since 2007 and currently works as the District Archaeologist and Tribal Liaison in both the Salem and Eugene Districts.

Jena Volpe – Fire and Fuels. Jena earned a Master of Science in biology/fire ecology from Southern Oregon University. She has 12 years of experience in fire ecology and fuels management with the National Park Service and the BLM in southwest Oregon and is currently a Fire Ecologist in the Medford District.

Abe Wheeler – Forest Management. Abe earned an Associate of Arts in business administration at Linn Benton Community College, and a Bachelor of Science in forest management at Oregon State University. He has seven years of experience with the BLM in field forestry, timber sale contract preparation, sale planning, and project leadership. Abe was also a key player in the recent design, analysis, and implementation of Roseburg District's Secretarial Pilot Project, as well as other more recent ecological forestry projects. He is currently a Plans Forester in the South River Field Office of the Roseburg District.

Several contract efforts support the work of the interdisciplinary team:

- A team of specialists at Mason, Bruce, & Girard, Inc., under the project management of Mark Rasmussen (Mason, Bruce, & Girard, Inc.), has conducted vegetation modeling of the alternatives using the Woodstock Optimization Platform model (Woodstock). Carolina Hooper of the interdisciplinary team has directed this work.
- A team of specialists at Environmental Resources Management (ERM) and subcontractors, under the project management of Clive Graham, ERM, has conducted socioeconomic analysis of the alternatives. Stewart Allen of the interdisciplinary team has directed this work.
- David W. LaPlante of Natural Resource Geospatial in Yreka, California, and Jeffrey R. Dunk of Humboldt State University in Arcata, California, have assisted the BLM with its evaluation of the northern spotted owl. They used the MaxEnt computer model to forecast how northern spotted owl habitat conditions would change on BLM-administered lands in western Oregon under different management scenarios. They used the spatially explicit, individual-based population model HexSim to forecast how northern spotted owls would respond demographically to such changes. Eric Greenquist and Craig Ducey of the interdisciplinary team have directed this work.
- A team of specialists at ECONorthwest assisted the BLM with its evaluation of recreation supply and demand throughout the project area. ECONorthwest collected recreation supply and demand data to identify particularly valuable recreation activities or resources for development, and estimate the value of recreation use and improvements. Zach Jarrett of the interdisciplinary team has directed this work.

Acronyms and Abbreviations

This section provides the main acronyms and abbreviations used in the document.

ACEC	area of critical environmental concern
AQI	Air Quality Index
ASQ	allowable sale quantity
AUM	animal unit month
bf	board foot or board feet
BLM	Bureau of Land Management
BMP	best management practice
C	carbon
CBWR	Coos Bay Wagon Road
CDP	Census Designated Place
CFR	Code of Federal Regulations
CMAI	culmination of mean annual increment
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CVS	Current Vegetation Survey
DBH	diameter at breast height
DPS	distinct population segment
EIS	environmental impact statement
EPA	Environmental Protection Agency
ERMA	Extensive Recreation Management Area
FEMAT	Forest Ecosystem Management Assessment Team
FLPMA	Federal Land Policy and Management Act
FOI	Forest Operations Inventory
FR	Federal Register
FRI	fire return interval
FS	U.S. Forest Service
FVS	Forest Vegetation Simulator
FWS	U.S. Fish and Wildlife Service
GFMA	General Forest Management Area
GIS	geographic information system
GNN	gradient nearest neighbor
HITA	High Intensity Timber Area
HLB	Harvest Land Base
HMA	herd management area
HUC	hydrologic unit code
ILAP	Integrated Landscape Assessment Project
LITA	Low Intensity Timber Area
LSR	Late-Successional Reserve
Mbf	thousand board feet
Mg	megagram
MITA	Moderate Intensity Timber Area
Mmbf	million board feet
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act

NMFS	National Marine Fisheries Service\
NO_x	nitrogen oxides
O_3	ozone
O&C	Oregon and California Lands Act
ODEQ	Oregon Department of Environmental Quality
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
OHTA	Owl Habitat Timber Area
OHV	off-highway vehicle
ORV	outstandingly remarkable value
PCT	Pacific Crest Trail
$PM_{2.5}$	particular matter with a diameter less than or equal to 2.5 micrometers
PM_{10}	particular matter with a diameter less than or equal to 10 micrometers
QMD	quadratic mean diameter
RCP	representative concentration pathway
RMA	Recreation Management Area
RNA	Research Natural Area
ROW	right-of-way
SCC	social cost of carbon
SFP	special forest product
SIP	State Implementation Plan
SO_2	sulfur dioxide
SPTH	site-potential tree height
SSRA	Smoke Sensitive Receptor Area
SYU	Sustained Yield Unit
RMP	resource management plan
RNA	research natural area
ROD	record of decision
SRMA	Special Recreation Management Area
TDSA	Tribal Designated Statistical Area
Tg	teragram
TMDL	Total Maximum Daily Load
TPCC	Timber Productivity Capability Classification
UTA	Uneven-aged Timber Area
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USC	United States Code
VOC	volatile organic compound
VRI	visual resource inventory
VRM	visual resource management

Glossary

Aboriginal homelands – Lands referenced in treaties and or legislation, although not officially ceded by a ratified treaty. It can also describe an area where people originated from prior to being relocated to reservations.

Acquired lands – Public lands that the Federal government has obtained by purchase, condemnation, gift, or exchange, as distinguished in the decision area from Coos Bay Wagon Road lands, O&C lands, and public domain lands.

Active crown fire – A solid flame consistently maintained in the canopy of the stand of trees or shrubs.

Age class – A system that categorizes forest *stands* by interval of years. For this analysis, the interval is 10-year increments. For example, a stand of ten-year age class of 60 includes ages 56-65.

Aggregated retention – See *variable-retention harvest system*.

Air quality attainment area – A geographic area with air quality as good as or better than the National Ambient Air Quality Standards as defined in the Clean Air Act. An area may be in attainment for one or more criteria pollutants but also be in nonattainment for one or more other criteria pollutants.

Air quality maintenance area – A geographic area that had a history of nonattainment, but are now consistently meeting the National Ambient Air Quality Standards. Maintenance areas have been re-designated by the U.S. Environmental Protection Agency (EPA) from "nonattainment" to "attainment with a maintenance plan," or designated by the Environmental Quality Commission.

Air quality nonattainment area – A geographic area that has not consistently met the clean air levels set by the U.S. Environmental Protection Agency in the National Ambient Air Quality Standards.

Allotment – An area of land in which one or more livestock operators graze their livestock. Allotments generally consists of BLM-administered lands but may include other federally managed, state-owned, and private lands.

Allowable Sale Quantity/Annual Productive Capacity – These terms are synonymous. The timber volume that a forest can produce continuously under the intensity of management described in the RMP for those lands allocated for permanent timber production.

Anadromous fish – Fish that are born and reared in freshwater, move to the ocean to grow and mature, and return to freshwater to reproduce.

Ancestral territory – Homelands and traditional territory of ancestral Tribes. Lands that may or may not have been formally ceded by a Tribe. May reference lands from which Tribes were forcibly removed and may or may not have been compensated for later. May also reference reservation lands that were taken back later.

Animal Unit Month (AUM) – The amount of forage necessary for the sustenance of one cow or its equivalent for 1 month.

Annual productive capacity – See *allowable sale quantity*.

Annual sustained yield capacity – Synonymous with *annual productive capacity*.

Aquatic habitat – Habitat that occurs in free water.

Area of Critical Environmental Concern (ACEC) – Lands where special management attention is needed to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish, and wildlife resources or other natural systems or processes or to protect life and provide safety from natural hazards.

Basal area – The cross-sectional area of a single plant stem, of all stems of a species in a stand, or of all plants in a stand (including the bark) that is measured at breast height (about 4.5 feet up from the ground) for larger plants (like trees) or measured at ground level for smaller plants.

Beneficial use – In water use law, reasonable use of water for a purpose consistent with the laws and best interest of the people of the state. Such uses include, but are not limited to, the following: instream, out of stream, and ground water uses, domestic, municipal, industrial water supply, mining, irrigation, livestock watering, fish and aquatic life, wildlife, fishing, water contact recreation, aesthetics and scenic attraction, hydropower, and commercial navigation.

Best Management Practices (BMPs) – Methods, measures, or practices designed to prevent or reduce water pollution. Usually, BMPs are applied as a system of practices rather than a single practice.

Bioclimatic envelope – The range of climatic conditions in which a species can survive and reproduce.

Biological legacies – An organism, a reproductive portion of an organism, or a biologically derived structure or pattern inherited from a previous ecosystem. Biological legacies often include large trees, snags, and down logs left after harvesting to provide refugia and to enrich the new stand structurally. See *variable-retention harvest*.

Biological Opinion – The document resulting from formal consultation that states the opinion of the Fish and Wildlife Service or National Marine Fisheries Service as to whether or not a federal action is likely to jeopardize the continued existence of listed species or results in destruction or adverse modification of critical habitat.

Biomass – Plant materials used as a source of renewable combustible fuel. Also includes woody material ground up into fiber and used in secondary wood products.

Board foot (BF) – Lumber or timber measurement term. The amount of wood contained in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide.

Breeding, nesting, roosting, foraging habitat – The vegetation with the age class, species composition, structure, sufficient area, and adequate food source to meet some or all of the life needs of specific species.

British thermal unit – A common unit of measuring energy in the English Inch-Pound (vs. Metric) system. Abbreviated Btu or BTU, it is the amount of heat required to raise 1 pound of water 1 °F.

Broadcastburn (ing) – A prescribed burning activity where fire is applied generally to most or all of an area within well-defined boundaries for reduction of fuel hazard, as a resource management treatment, or both. Canopy is generally either non-existent or not an objective to retain.

BTU – See *British thermal unit*.

Bureau sensitive species – Plant or animals species eligible for federal listed, federal candidate, state listed, or state candidate (plant) status, or on list 1 in the Oregon Natural Heritage Data Base, or approved for this category by the BLM State Director.

Cable yarding – The movement of cut trees or logs from the area where they are felled to the *landing* on a system composed of suspended cables.

Candidate species – Taxa for which the U.S. Fish and Wildlife Service has sufficient information on their status and threats to propose the species for listing as endangered or threatened under the Endangered Species Act, but for which issuance of a proposed rule is currently precluded by higher priority listing actions. Separate lists for plants, vertebrate animals, and invertebrate animals are published periodically in the Federal Register.

Canopy – The area consisting of branches and foliage formed collectively by adjacent trees and other woody species in a forest stand. Where significant height differences occur between trees within a stand, formation of a multi-layered condition can result.

Canopy base height – The average distance (height) from the ground level to the lower branches of the trees that form the main forest canopy where there is sufficient crown loading in needle and 1-hour fuels for a certain level of surface fire intensity to transition into the crown.

Canopy bulk density – The mass of available canopy fuel per unit canopy volume.

Canopy cover – a measure of the percentage of ground covered by a vertical projection of the tree crowns.

Canopy closure – The proportion of the sky hemisphere obscured by vegetation when viewed by a single point.

Ceded lands – Tribal lands acquired by the United States government that a tribe ceded, granted, relinquished, sold, or lost rights to under a treaty or other agreement or law of the United States in exchange for rights and/or benefits.

Checkerboard ownership – A land ownership pattern in which every other section (square mile) is in federal ownership as a result of federal land grants to early western railroad companies.

Clearcut – A timber harvesting method that removes essentially all trees in an area, producing a fully exposed microclimate over the majority of the harvested area.

Climax stage – See *seral stages*.

Closed canopy – The degree to which the canopy (forest layers above one's head) blocks sunlight or obscures the sky. It can only be accurately determined from measurements taken under the canopy to account for openings in the branches and crowns.

Coarse woody debris/downed woody debris – Portion of a tree that has fallen or been cut and left in the woods. Usually refers to pieces at least 20 inches in diameter.

Conditional crown fire – A crown fire that will not initiate within the stand under given conditions, but canopy fuels are sufficiently dense to support an active crown fire entering from an adjacent stand.

Commercial forest land base – Forest lands declared suitable for producing timber and having a minimum level of productivity of 20 cubic feet/acre/year. Contrast with *harvest land base*.

Commercial thinning – Any type of thinning producing merchantable material at least equal to the value of the direct cost of harvesting. See *thinning*.

Condition class (fire regimes) – Fire regime condition classes are a measure describing the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components, such as species composition, structural stage, stand age, canopy closure, and fuel loadings. One or more of the following activities may have caused this departure: fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plan species, introduced insects or disease, or other management activities.

Conservation strategy – A management plan for a species, group of species, or ecosystem that prescribes standards and guidelines that if implemented provide a high likelihood that the species, groups of species, or ecosystem, with its full complement of species and processes, will continue to exist well-distributed throughout a planning area.

Consultation – A formal interaction between the U.S. Fish and Wildlife Service and another federal agency when it is determined that the agency's action may affect a species that has been listed as threatened or endangered or its critical habitat.

Convection – Transfer of heat by the automatic circulation of fluids.

Cooperating agency – A tribe or Federal, State, or local government agency that assists the lead federal agency in developing an environmental assessment or environmental impact statement. These can be any agency with jurisdiction by law or special expertise for proposals covered by NEPA (40 CFR 1501.6).

Coos Bay Wagon Road (CBWR) Lands – Public lands that were granted to the Southern Oregon Company for construction of a military road, but subsequently reconveyed to the United States.

Council on Environmental Quality (CEQ) – An advisory council to the President of the US established by the National Environmental Policy Act of 1969. It reviews federal programs to analyze and interpret environmental trends and information.

County service area – Refers to those counties where tribal members reside that all tribally-operated programs and services are available to them. The particular number and specific counties vary from Tribe to Tribe.

Criteria pollutants – Six principle pollutants considered most harmful to public health and the environment and that can be monitored effectively. They include carbon monoxide (CO), lead (Pb), nitrogen oxides (NO_x), sulfur dioxide (SO_2), ozone (O_3), and particulate matter of two different aerodynamic diameters (PM_{10} and $PM_{2.5}$).

Critical habitat – Under the Endangered Species Act, critical habitat is defined as: (1) the specific areas within the geographic area occupied by a federally listed species on which are found physical and biological features essential to the conservation of the species, and that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by a listed species, when it is determined that such areas are essential for the conservation of the species.

Crown – Upper part of a tree or other woody plant that carries the main system of branches and the foliage.

Crown fire – A fire that burns in the upper tree or shrub canopy. Crown fires are sometimes classified as independent (conditional) or dependent (active or passive) to distinguish the degree of independence from the surface fire.

Cubic foot – A unit of solid wood, one foot square and one foot thick.

Culmination of mean annual increment (CMAI) – The age in the growth cycle of a tree or stand at which the mean annual increment (MAI) for which some attribute, e.g., wood volume of a tree or stand growth is at maximum. At culmination, MAI equals the periodic annual increment (PAI).

Cultural resources – Locations of human activity, occupation, or use. Cultural resources include archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and locations of traditional cultural or religious importance to specified social and/or cultural groups.

Cumulative effect – The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time.

Current Vegetation Survey – BLM's regional permanent plot inventory. Each sampling point has a series of nested concentric sub-plots, in which trees of different diameter classes are measured. Live and dead trees, coarse woody debris, and understory vegetation are measured. The plots are located on a 1.7-mile grid, on BLM land, if at least one subplot is forested.

Debris flow – A rapid moving mass of rock fragments, soil, and mud, with more than half of the particles being larger than sand size.

Decision area – The lands within the planning area of this RMP revisions for which the BLM has authority to make land use and management decisions. In general, the BLM has jurisdiction over all BLM-administered lands (surface and subsurface) and over subsurface minerals in areas of split estate (i.e., areas where the BLM administers federal subsurface minerals, but the surface is not owned by the BLM).

Deciview – a unit of visibility proportional to the logarithm of the atmospheric extinction; a measure of how hazy the atmosphere is over a period; the smaller the number, the clearer the air.

Desired future condition – For rangeland vegetation, the condition of rangeland resources on a landscape scale that meet management objectives. It is based on ecological, social, and economic considerations during the land planning process. It is usually expressed as ecological status or management status of vegetation (species composition, habitat diversity, and age and size class of species) and desired soil qualities (soil cover, erosion, and compaction). In a general context, desired future condition is a portrayal of the land or resource conditions that are expected to result if goals and objectives are fully achieved.

Detrimental soil disturbance – The limit where the innate soil properties change and the inherent capacity to sustain growth of vegetation is reduced. Detrimental soil disturbance generally represents unacceptable levels of erosion, loss of organic matter, soil compaction, soil heating, or soil displacement.

Diameter breast height (DBH) – The diameter of the stem of a tree measured at 4.5 feet above the ground level on the uphill side of the stem. See *quadratic mean diameter*.

Dispersal habitat (northern spotted owl) – Forest stands with average tree diameters of greater than11 inches, and conifer overstory trees having closed canopies (greater than 40 percent canopy closure) with open space beneath the canopy to allow owls to fly.

Dispersed retention – See *variable-retention harvest system*.

Disposal – Transfer of public land out of federal ownership to another party through sale, exchange, Recreation and Public Purposes Act of 1926, Desert Land Entry or other land law statutes.

Disturbance (natural) – A force that causes significant change in structure and/or composition through natural events such as fire, flood, wind, or earthquake, mortality caused by insect or disease outbreaks, or by human-caused events such as the harvest of forest products.

Eligible river – A river or river segment found to meet criteria found in Sections 1(b) and 2(b) of the Wild and Scenic Rivers Act of being free flowing and possessing one or more outstandingly remarkable value.

Endangered species – Any species of plant or animal defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range, and published in the Federal Register.

Environmental Impact Statement (EIS) – A detailed statement prepared by the responsible official in which a major federal action that significantly affects the quality of the human environment is described, alternatives to the proposed action are provided, and effects are analyzed.

Even-aged management – A *silvicultural system*, which creates forest stands that are primarily of a single age or very narrow range of ages. See *even-aged stand*.

Even-aged stand – A *stand* composed of a single distinct *age class* managed as a discrete operational unit. See *even-aged management*.

Fire frequency – The number of times that fires occur within a defined area and time period.

Fire hazard – A fuel complex, defined by volume, type condition, arrangement, and location, that determines the degree of ease of ignition and of resistance to control.

Fire regime – Description of the patterns of fire occurrences, frequency, size, severity, and sometimes vegetation and fire effects as well, in a given area or ecosystem. A fire regime is a generalization based on fire histories at individual sites.

Fire resilient forest – A forest having characteristics that limit fire severity and increase the resistance of the forest to mortality.

Fire return interval – The time between fires in a defined area, usually at the scale of a point, stand or relatively small landscape area. This is called Mean Fire Interval (MFI) in the LANDFIRE system, where it refers to the average number of years between fires in representative stands.

Fire suppression – Fire management actions taken to extinguish a fire or confine fire spread.

Fifth-field watershed – Individual watershed within a Hydrologic Unit as defined by the U.S. Geological Survey, typically averages 87,000 acres in size.

Floodplain – Level lowland bordering a stream or river onto which the flow spreads at flood stage.

Forage – All browse and herbaceous foods available to grazing animals, including wildlife and domestic livestock.

Forest Operations Inventory (FOI) – An intensive inventory that provides managers with information regarding age, species, stand location, size, silvicultural needs, and recommended treatment based on individual stand conditions and productivity.

Forestland – Land at least 10 percent stocked by forest trees of any size, and including land that formerly had such tree cover and capable of redeveloping forested conditions.

Fluid minerals – Oil, gas, coal bed natural gas, and geothermal resources.

Fuel loads – The amount of combustible material present per unit area.

Genetic gain – The average improvement of a specific trait in a population of progeny over the average of the parental population, e.g., height growth increase.

Geographic Information System (GIS) – A system of computer hardware, software, data, people, and applications that capture, store, edit, analyze, and display a potentially wide array of geospatial information.

Geothermal energy – Natural heat from within the Earth, captured for production of electric power, space heating or industrial steam.

Gradient Nearest Neighbor – A method to characterize forest vegetation across a region that integrates vegetation measurements from regional networks of field plots, mapped environmental data, and Landsat TM data. The method applies direct gradient analysis (canonical correspondence analysis) and nearest-neighbor imputation to ascribe detailed ground attributes of vegetation to each patch in a regional landscape.

Gravel interstitial space – The pockets between pieces of gravel.

Green-tree – A live tree.

Green-tree retention – A stand management practice in which live trees are left within harvest units to provide a legacy of habitat components over the next management cycle. See *variable-retention harvest*.

Ground-based yarding – The movement of cut trees or logs from the area where they are felled to the landing through the use of mechanical equipment or animals that move along the ground.

Group selection harvest – In an uneven-aged system, trees are harvested in small groups. Synonymous with "patch cut." See *selection cutting*.

Growth and yield modeling – Simulated projections of forest stand growth and development, from which timber volume estimates and other stand attributes expected to be produced per unit area under a certain set of conditions are derived.

Handpile – Piling of fuels by hand.

Harvesting – The process of cutting and removing of merchantable trees from a forested area.

Harvest land base – Those lands on which the determination and declaration of the Annual Productive Capacity / Allowable Sale Quantity (ASQ) is based. The ASQ is based on implementing a set of specific timber management activities and assumes those practices will be repeated over time and results in a sustainable harvest level.

Helicopter yarding – The movement of cut trees or logs from the area where they are felled to the landing through the use of helicopters.

Herbaceous vegetation – Seed-producing annual, biennial, or perennial vegetation that does not develop persistent woody tissue, but dies down at the end of a growing season.

Herd Management Area – Public land under the jurisdiction of the BLM that has been designated for special management emphasizing the maintenance of an established wild horse or burro herd.

High-severity fire – Greater than 75 percent of the total canopy cover, or basal area, is killed by the sum of all fire effects.

Intermittent stream – A stream that flows most of the time, but occasionally is dry or reduced to pools.

Intrinsic potential (stream) – A stream's inherent ability to provide high quality habitat for salmonids.

Invasive species – A non-native species whose introduction does, or is likely to, cause economic or environmental harm or harm to human health.

Ladder fuel – Fuel that provides vertical continuity between forest strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease.

Landing – A cleared area in the forest to which logs are yarded for loading onto trucks for transport.

Landscape – A heterogeneous land area with interacting ecosystems that are repeated in similar form throughout.

Land Use Allocation – The identification in a land use plan of the activities and foreseeable development that are allowed, restricted, or excluded for all or part of the planning area, based on desired future conditions.

Leasable minerals – Minerals generally found in bedded deposits and include oil, gas, coal, chlorides, sulfates, carbonates, borates, silicates, and nitrates of potassium (potash) or sodium and related products; sulfur; phosphate and its associated and related minerals; asphalt; and gilsonite.

Locatable minerals – Metallic minerals (gold, silver, lead, copper, zinc, nickel, etc.) and nonmetallic minerals (fluorspar, mica, certain limestone and gypsum, tantalum, heavy minerals in placer form and gemstones) in land belonging to the United States that are open to citizens of the United States for exploration, discovery, and location which conveys the exclusive right to extract the locatable minerals upon receiving all required authorizations in accordance with regulations at 43 CFR 3802 for lands in wilderness review and 3809 for other public lands.

Lop and scatter – The cutting of branches, tops, and unwanted boles into lengths that will lie close to the ground and spreading debris more or less evenly.

Low-severity fire – Less than 25 percent of the total canopy cover or basal area is killed by the sum of all fire effects.

Machine pile – The piling of activity fuels with machinery.

Mass wasting – The downslope movement of earth materials caused by gravity. This is an all-inclusive term that includes, but is not limited to: landslides, rock falls, debris avalanches, and creep. It does not, however, include surface erosion by running water.

Mean annual increment (MAI) – the total cumulative quantity produced over time of some attribute of a tree or *stand* growth, e.g., wood volume divided by the total age of the tree or *stand*.

Mechanical mastication – The mechanical crushing, grinding, shredding of shrubs, small trees, and downed woody material, leaving a low-profile matted continuous surface fuel bed.

Merchantable – Trees or *stands* having the size, quality and condition suitable for marketing under a given economic condition, even if not immediately accessible for logging.

Mineral estate – The ownership of minerals, including rights necessary for access, exploration, development, mining, ore dressing, and transportation operations.

Mining claim – A parcel of land that a miner takes and holds for mining purposes, having acquired the right of possession by complying with the Mining Law and local laws and rules. A mining claim may contain as many adjoining locations as the locator may make or buy. There are four categories of mining claims: lode, placer, millsite, and tunnel site.

Mixed-severity fire – The severity of fires varies between nonlethal understory and lethal stand-replacement fire with the variation occurring in space or time. The result may be a mosaic of young, older, and multiple-aged vegetation patches as a function of landscape complexity or vegetation patterning. Typically, more than 25% and less than 75% of the total canopy cover or basal area is killed by the sum of all effects. Fires may also vary over time between low-intensity surface fires and longer-interval stand replacement fires.

Modeling – A scientific method that operates by a structured set of rules and procedures to simulate current conditions and predict future conditions.

Monitoring – The review on a sample basis, of management practices to determine how well objectives are being met, as well as the effects of those management practices on the land and environment.

Multi-layered canopy – Forest *stands* with two or more distinct *canopy* layers.

Multi-aged stand – *Two*-aged and *uneven*-aged stands.

National Landscape Conservation System – Special Congressional or Presidential land use designations such as National Monuments, Wild and Scenic Rivers, and Wilderness Areas.

Non-commercial thinning (management) – Cutting *merchantable* trees but not removing them from the *stand*.

No Surface Occupancy – A fluid minerals leasing constraint that prohibits occupancy or disturbance on all or part of the lease surface to protect special values or uses. Lessees may exploit the fluid mineral resources under the leases restricted by this constraint through use of directional drilling from sites outside the No Surface Occupancy area.

O&C lands – Public lands granted to the Oregon and California Railroad Company and subsequently revested to the United States.

Off-Highway Vehicle (OHV) – Any motorized track or wheeled vehicle designed for cross-country travel over any type of natural terrain.

Off-highway vehicle designation – Designation of lands made in a land use plan for use of off-highway vehicles:

> Open: All types of vehicle use is permitted at all times, anywhere in the area subject to certain operating regulations and vehicle standards.
> Limited: Restricted at certain times, in certain areas, and/or to certain vehicular use.
> Closed: Off-road vehicle use is prohibited.

Outstandingly Remarkable Values – Values among those listed in Section 1(b) of the Wild and Scenic Rivers Act of 1968: "scenic, recreational, geological, fish and wildlife, historical, cultural, or other similar values...." Other similar values that may be considered include ecological, biological, or botanical.

Overstory – That portion of trees forming the uppermost canopy layer in a forest stand and that consists of more than one distinct layer.

Paleontological resource – Remnants of life from past geological ages as seen in fossil plants and animals.

Particulate matter (PM) – A complex mixture consisting of varying combinations of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid, typically measured in micrometers (e.g., $PM_{2.5}$ – particular matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers).

Passive crown fire – A fire that initiates from the surface fuels, up through the ladder fuels, and into the aerial fuels in the crowns of trees in which individual trees or groups of trees torch.

Peak flow – The highest amount of stream or river flow occurring in a year, or from a single storm event.

Perennial stream – A stream that typically has running water on a year-round basis.

Periodic annual increment (PAI) – the difference in a stand attribute at two successive measurements, divided by the number of years between measurements. PAI is an approximation to current annual increment, which is not directly measurable.

Physiographic province – A geographic area having a similar set of biophysical characteristics and processes due to effects of climate and geology, which result in patterns of soils and broad-scale plant communities. Habitat patterns, wildlife distributions, and historical land use patterns may differ significantly from those of adjacent provinces.

Pile burning – Activity fuels, once piled by machine or by hand, are burned in place.

Planning area – All lands within the geographic boundary of this RMP revision regardless of jurisdiction.

Planned ignition – The intentional initiation of a wildland fire by hand-held, mechanical or aerial device where the distance and timing between ignition lines or points and the sequence of igniting them is determined by environmental conditions (weather, fuel, topography), firing technique, and other factors which influence fire behavior and fire effects.

Plant association group – A vegetation classification including five to ten closely related plant associations, or groupings of plants that occur together in similar environments, typically defined by their climates (temperature and moisture), soils, and history of natural disturbances, such as wildfires, diseases and insect outbreaks.

Pre-commercial thinning (PCT) – The practice of reducing the density of trees within a stand by manual cutting, girdling, or herbicides to maintain or promote growth increases of desirable tree species. The trees killed are generally not *merchantable* and not removed from the treated area.

Preferred Alternative – Term used in the Council on Environmental Quality's implementing regulations of the National Environmental Policy Act (NEPA) and BLM planning regulations. Guidance from the Council on Environmental Quality explains that the preferred alternative is the alternative that the agency believes would fulfill its statutory mission and responsibilities, considering economic, environmental, technical, and other factors.

Prescribed fire – A wildland fire originating from a planned ignition to meet specific objectives identified in a written, approved, prescribed fire plan for which NEPA requirements have been met prior to ignition. See *planned ignition*.

Progeny test site – A test area for evaluating parent seed trees by comparing the growth of their offspring seedlings.

Public domain lands – Original holdings of the United States never granted or conveyed to other jurisdictions, or reacquired by exchange for other public domain lands.

Public land – Land or interest in land owned by the U.S. and administered by the Secretary of the Interior through the BLM without regard to how the U.S. acquired ownership, except lands located on the Outer Continental Shelf and land held for the benefit of Indians, Aleuts, and Eskimos.

Quadratic mean diameter – The diameter of the tree of average *basal area* in a stand at breast height. See *diameter breast height*.

Recovery plan – A plan for the conservation and survival of an endangered species or a threatened species listed under the Endangered Species Act, for the purpose of improving the status of the species to the point where listing is no longer required.

Regeneration – (n.) Tree seedlings or saplings existing in a stand. (v.) The process of re-establishing trees on a tract of forest land where harvest or some natural event has removed existing trees.

Regeneration harvest(ing) – Any removal of trees intended to assist regeneration already present or make regeneration possible.

Relative density (RD) – A means of describing the level of competition among trees or site occupancy in a stand, relative to some theoretical maximum based on tree density, size and species composition. Relative density is determined mathematically by dividing the stand *basal area* by the square root of the *quadratic mean diameter*.

Relevant and important resource value – Criteria used to evaluate nominated Areas of Critical Environmental Concern.

Renewable energy – See *sustainable energy.*

Resource Management Plan (RMP) – A land use plan as prescribed by the Federal Land Policy and Management Act that establishes, for a given area of land, land-use allocations, management objectives, and management direction.

Right-of-way – A permit or an easement that authorizes use of public lands for certain specified purposes, commonly for pipelines, roads, telephone lines, electric lines, reservoirs, and so on; also, the lands covered by such an easement or permit.

Riparian area – A geographic area containing an aquatic ecosystem and adjacent upland areas that directly affect it.

Rotation [age] – The planned number of years between the establishment of an even-aged or two-aged forest *stand* and its *regeneration harvest*.

Salable minerals – Minerals including but not limited to: petrified wood and common varieties of sand, stone, gravel, pumice, pumicite, cinder, clay, and rock.

Salvage harvest(ing) – Removal of dead trees or of trees damaged or dying because of injurious agents other than competition, to recover their economic value.

Seed orchard – A plantation of clones or seedlings from selected trees; isolated to reduce pollination from outside sources, weeded of undesirables, and cultured for early and abundant production of seed.

Selection harvest(ing) – A method of uneven-aged management involving the harvesting of single trees from stands (single-tree selection) or in groups up to four (4) acres in size (group selection) without harvesting the entire stand at any one time.

Seral stages – The series of relatively transitory plant communities that develop during ecological succession from bare ground to the climax stage.

Shelterwood harvest(ing) – A *regeneration* harvest method under an *even-aged* silvicultural system. With this method a portion of the mature stand is retained as a source of protection during the *regeneration* period. The retained trees are removed when protection requirements have been met.

Silvicultural practices (or treatments or system) – The set of field techniques and general methods used to modify and manage a forest stand over time to meet desires conditions and objectives. Examples include reforestation, precommercial thinning, and commercial thinning.

Silvicultural prescription – A planned series of treatments designed to change current stand structure to one that meets management goals.

Silvicultural system – A planned series of treatments for tending, harvesting, and reestablishing a *stand*. The system name is based on the number of *age classes* managed within a *stand*, e.g., *even-aged*, *two-aged*, *uneven-aged*).

Site class – A classification of an area's relative productive capacity for tree growth commonly expressed in terms of the heights of the largest trees in a stand at a common "index" age, usually 50 or 100 years-old. Site classes are numbered from 1 (most productive) to 5 (least productive).

Site potential tree height – Is the average maximum height of the tallest dominant trees (200 years or older) for a given *site class*.

Slash – The branches, bark, tops, cull logs, and broken or uprooted trees left on the ground after logging has been completed.

Slope stability – The resistance of a natural or artificial slope, or other inclined surface, to failure by landsliding (mass movement).

Snag – Any standing dead, partially-dead or defective (cull) tree at least 10 inches in diameter at breast height and at least 6 feet tall. A hard snag is composed primarily of sound wood, generally merchantable. A soft snag is composed primarily of wood in advanced stages of decay and deterioration, generally not merchantable.

Soil compaction – An increase of the soil bulk density (weight per unit volume) compared to undisturbed soil, and a decrease in porosity (particularly macropores) resulting from applied loads, vibration or pressure.

Soil productivity – Capacity or suitability of a soil, for establishment and growth of a specified crop or plant species.

Soil quality – The capacity of a soil to function for specific land uses or within ecosystem boundaries. This capacity is an inherent characteristic of a soil and varies from soil to soil. Indicators such as organic-matter content, salinity, tilth, compaction, available nutrients, and rooting depth help measure the health or condition of the soil-its quality-in any given place.

Special forest products – Those plant and fungi resources that are harvested, gathered or collected by permit, and have social, economic, or spiritual value. Common examples include mushrooms, firewood, Christmas trees, tree burls, edibles and medicinals, mosses and lichens, floral and greenery, and seeds and cones, but not soil, rocks, fossils, insects, animal parts, or any timber products of commercial value.

Special status species – Plant or animal species in any of the following categories:

- Threatened or endangered species
- Proposed threatened or endangered species
- Candidate species

- State-listed species
- Bureau sensitive species

Stand – An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement, and condition so that it is distinguishable from the forest in adjoining areas and managed as a discrete operational unit.

Stand conversion – Converting one type of forest *stand* to another type. Typically refers to changing areas dominated by hardwood species to one dominated by conifer species.

Stand replacement fire – A fire that is lethal to most of the dominant above ground vegetation and substantially changes the vegetation structure. Stand replacement fires may occur in forests, woodlands and savannas, annual grasslands, and shrublands. They may be crown fires, or high-severity surface fires, or ground fires.

State-listed species – Plant or animal species listed by the State of Oregon as threatened or endangered pursuant to ORS 496.004, ORS 498.026, or ORS 564.040.

Stream reach – An individual first order stream or a segment of another stream that has beginning and ending points at a stream confluence. Reach end points are normally designated where a tributary confluence changes the channel character or order. Although reaches identified by BLM are variable in length, they normally have a range of 0.5 mile to 1.5 miles in length unless channel character, confluence distribution, or management considerations dictate variance.

Stumpage price – The value of standing timber.

Suitable river – An eligible river segment found through administrative study to meet the criteria for designation as a component of the National System, as specified in Section 4(a) of the Wild and Scenic Rivers Act.

Surface fire – A fire that burns on the surface of the ground and consumes surface fuels.

Surface fuel – Fuels lying on or near the surface of the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low stature living plants.

Sustainable energy – Energy that comes from resources that are naturally replenished on a human timescale such as sunlight, wind, rain, tides, waves, and geothermal heat, as opposed to "fossil energy" which comes from resources replenished on a geological timescale.

Sustained yield – The board foot volume of timber that a forest can produce in perpetuity at a given intensity of management; the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources without impairment of the productivity of the land.

Sustained yield unit (SYU) – An administrative unit for which an allowable sale quantity is calculated; in western Oregon, a BLM district.

Thinning – A silvicultural treatment made to reduce the density of trees primarily to improve tree/stand growth and vigor, and/or recover potential mortality of trees, generally for commodity use. See *pre-commercial thinning*, *commercial thinning*, *variable-density thinning*.

Timber Production Capability Classification (TPCC) – The process of partitioning forestland within the Sustained Yield Unit into major classes based on the biological and physical capability of the site to support and produce forest products on a sustained yield basis using operational management practices.

Timber volume – Amount of timber contained in a log, a stand, or a forest, typically measured in board feet or cubic feet.

Threatened species – Those plant or animal species likely to become endangered species throughout all or a significant portion of their range within the foreseeable future. A plant or animal identified and defined in accordance with the 1973 Endangered Species Act and published in the Federal Register.

Torching – The burning of the foliage of a single tree or a small group of trees, from the bottom up. See *passive crown fire*.

Tribal consolidation area of ancestral lands – The specific area of land described by the Tribe, approved by the Secretary of the Interior, and placed into trust for the Tribe according to 25 CFR 151.2.

Tribal fee land – Lands in which a Tribe has acquired title to through purchase or donation but the federal government has not put into trust, therefore state and local laws apply including payment of property and timber harvest taxes.

Trust land – Land in which the federal government holds title to for the use and benefit of a Tribe.

Two-aged stand – A stand composed of two (2) distinct age classes intimately mixed and/or in aggregated groups producing a two-story structure managed as a discrete operational unit.

Two-aged system – A *silvicultural system* intended to regenerate and maintain stands with two distinct age classes.

Underburn – A fire that consumes surface fuels but not the overstory canopy.

Underburning – Prescribed burning under a forest canopy.

Understory – That portion of trees or other woody vegetation which form the lower layer in a forest stand which consists of more than one distinct layer.

Uneven-aged management – A *silvicultural system* that simultaneously maintains high degree of tall forest cover, recurring *regeneration* of desirable species, and the orderly growth and development of trees through a range of diameter or *age classes*. *Harvesting* methods that develop and maintain uneven-aged stands are *single-tree selection*, *group selection*, and *thinning*.

Uneven-aged stand – A *stand* composed of at least three (3) distinct age classes intimately mixed and/or in aggregated groups producing a *multi-layered canopy* structure managed as a discrete operational unit.

Use of wildland fire – Management of either wildfire or prescribed fire to meet resource objectives.

Usual and accustomed areas – Areas regularly utilized and accessed by antecedent tribes or bands prior to treaty signing.

Variable-density thinning (VDT) – A *thinning* method where two or more densities of retained trees are used to promote *stand* heterogeneity through the development of *multi-layered canopies*. Provision of conditions conducive to the initiation and growth of *regeneration* is usually an objective of VDT.

Variable-retention harvest (VRH) – An approach to *regeneration* harvesting that is based on the retention of structural elements or *biological legacies* from the harvested stand for integration into the new stand to achieve various ecological objectives. The resultant stand is generally *two-aged*. The major variables in variable- retention harvest systems are the types, densities and spatial arrangement of the retained structures; 1) *aggregated retention* is the retention of structures as (typically) intact forest patches within or adjacent to the harvest unit; 2) *dispersed retention* is the retention of structures or *biological legacies* in a more or less scattered pattern. Variable-retention harvest is synonymous with *green-tree retention*, retention harvest, retention forestry.

Visual Resource Management (VRM) – The inventory and planning actions to identify values and establish objectives for managing those values and the management actions to achieve those objectives.

Visual Resource Management classes – Categories assigned to public lands based on scenic quality, sensitivity level, and distance zones. There are four classes. Each class has an objective that prescribes the amount of change allowed in the characteristic landscape.

Water quality – The chemical, physical, and biological characteristics of water with respect to its suitability for a particular use.

Watershed – An area in which all surface waters flow to a common point.

Wild and Scenic Rivers system – A system of nationally designated rivers and their immediate environments that have outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values and are preserved in a free-flowing condition.

Wilderness – An area defined in Section 2(c) of the Wilderness Act, and formally designated by Congress as part of the National Wilderness Preservation System.

Wilderness characteristics – These attributes include the area's size, its apparent naturalness, and outstanding opportunities for solitude or a primitive and unconfined type of recreation. They may also include supplemental values. Lands with wilderness characteristics are those lands that have been inventoried and determined by the BLM to contain wilderness characteristics as defined in section 2(c) of the Wilderness Act.

Wilderness Study Area – Areas with wilderness characteristics identified and designated through the inventory and study processes authorized by Section 603 of FLPMA, and, prior to 2003, through the planning process authorized by Section 202 of FLPMA.

Wildfire – Unplanned ignition of a wildand fire (such as a fire caused by lightning or unauthorized and accidental human – caused fires) and escaped prescribed fires.

Wildfire risk – The likelihood and susceptibility for a wildfire to adversely affect human values (e.g. life, property, ecological functions and resources, etc.).

Wildland Developed Areas – A delineation of where people live in the wildland, classifying a minimum of one structure per 40 acres as a developed area.

Wildland fire – A general term describing a non-structure fire that occurs in the wildland.

Wildland Urban Interface (WUI) – The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetation fuels.

Windthrow – A tree or trees uprooted or felled by the wind.

Yarding – The process of moving cut logs to a landing, particularly by cable, ground-based or helicopter yarding systems.

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